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by E. O. PEARSON

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Thobbi (V. V.). **Life-history, bionomics and control of** ***Hispella stygia*****, Chap.**—*Mysore agric. J.* **34** no. 2 pp. 52–58. Bangalore, 1959.

A survey of rice pests in Bombay Karnatak showed that two Hispids damaged the crop, *Dicladispa* (*Hispa*) *armigera* (Ol.), the more important one, and *Hispa* (*Hispella*) *stygia* (Chap.). Since little was known of the latter, its bionomics were investigated. The damage caused by it was similar to that caused by *D. armigera*, consisting of superficial leaf damage by the adults and mining by the larvae. The females were fertilised 8–10 days after emergence and oviposited four days later, the eggs being laid singly in abrasions on the leaves at the rate of 22–159 per female. The egg, larval and pupal stages lasted 5–7, 12–14 and 6–7 days, respectively, in June–October, and the adults lived for 11–48 days. There were 4–5 overlapping generations a year, of which the first occurred mostly on *Polytoca barbata*, a wild grass common near rice-fields, the second and third on sorghum and rice, and the later ones on these crops and wild grasses. Winter was passed by the adults on guinea grass (*Panicum maximum*). *Campyloneurus* sp., *Elasmus* sp. and *Proacrias* sp. were found to parasitise the larvae, and *Pyemotes* (*Pediculoides*) sp. preyed on the adults. In laboratory tests, 50 per cent. wettable DDT at 1 lb. in 20 gal. water gave complete kill of the adults and was more effective than a 3 per cent. BHC dust.

Peiris (J. W. L.) & Bertus (A. L.). **The tristeza disease of** ***Citrus*** **in Ceylon.** —*Trop. Agriculturist* **114** (1958) no. 4 pp. 221–229, 15 refs. [Colombo, 1959.]

Since a decline of *Citrus* seedlings, chiefly sweet orange, in the Wellassa (Bibile) area of Ceylon was not eliminated by improved cultivation and control of fungus diseases and was also observed in other districts, the presence of the tristeza virus [*cf. R.A.E.*, A **44** 330, etc.] was suspected. Some confirmation was provided by grafting experiments and by tests in which *Toxoptera citricidus* (Kirk.), which was found on *Citrus* at Bandarawela and Peradeniya and is the most efficient vector of the virus, was allowed to feed for 24 hours on the foliage of a tree showing decline and then for two days on various varieties of *Citrus*. The symptoms obtained were somewhat atypical and suggested the presence of a more virulent strain of the virus than those described hitherto.

López Matos (L.). **Evidence of the presence of the tobacco-etch virus in Puerto Rico.**—*J. Agric. Univ. P.R.* **43** no. 3 pp. 171–181, 3 figs., 6 refs. Rio Piedras, P.R., 1959. (With a summary in Spanish.)

The following is based on the author's summary. A new virus disease was found in cigar-filler and chewing-tobacco plants in Porto Rico in 1954. The infected plants developed chlorotic spots on the younger leaves, followed by necrotic spots, arcs, and sometimes rings as the leaves became older. The younger leaves also appeared slightly chlorotic. The virus was transmitted experimentally by mechanical means and by *Myzus persicae* (Sulz.), and it was identified as tobacco etch. The variety of symptoms observed suggests that, besides severe etch, the mild- and coarse-etch strains of the virus may also be present in Porto Rico.

ESTRADA R. (F. A.). **Lista preliminar de insectos asociados al maíz en Nicaragua.** [Preliminary list of insects associated with maize in Nicaragua.]—*Turrialba* **10** no. 2 pp. 68–73. Turrialba, Costa Rica, 1960. (With a summary in English.)

A list is given of over 70 insects found associated with maize growing near Managua and in certain other regions of Nicaragua. The most important of the pests were *Spodoptera* (*Laphygma*) *frugiperda* (J. E. Smith), *Zeadiatraea* (*Diatraea*) *lineolata* (Wlk.), *Heliothis zea* (Boddie), *Estigmene acraea* (Dru.), *Elasmopalpus lignosellus* (Zell.) and Cicadellids. The last included *Dalbulus maidis* (DeLong & Wolc.), which elsewhere transmits a virus disease of maize [*cf. R.A.E.*, A **46** 493], the existence of which in Nicaragua can be presumed.

LOPES CABRAL (A.) & MOREIRA (I. S.). **Da ocorrência de algumas pragas de produtos ultramarinos em porões de navios mercantes (carreira da Guiné).** [The occurrence of certain pests of overseas products in the holds of merchant ships (Guinea line).]—*Garcia de Orta* **8** no. 1 pp. 47–57, 2 graphs, 9 refs. Lisbon, 1960. (With summaries in French & English.)

This is an account of investigations in Portugal on the occurrence of certain stored-product pests in the holds of ships transporting such products from Portuguese Guinea to Lisbon. The pests concerned were *Sitophilus* (*Calandra*) *oryzae* (L.), *Caryedon gonagra* (F.), *Dermestes* spp., *Cadra* (*Ephestia*) *cautella* (Wlk.), *Tenebroides mauritanicus* (L.) and *Tribolium* spp. The most important were *Tribolium*, *Caryedon* and *Cadra*, which infest stored groundnuts.

ALBRECHT (F. O.). **Facteurs internes et fluctuations des effectifs chez** *Nomadacris septemfasciata* **(Serv.).**—*Bull. biol.* **93** fasc. 4 pp. 414–461, 8 figs., 21 refs. Paris, 1959. (With a summary in English.)

The following is based largely on the author's summary of this account of laboratory investigations on the effect of crowding on fertility in *Nomadacris septemfasciata* (Serv.), the results of which are compared with those of similar work with *Locusta migratoria migratorioides* (R. & F.) [*R.A.E.*, A **48** 500–501, in which the sizes of the cages mentioned should be corrected to 38 × 38 × 52 cm. and 12 l. (0·416 cu ft.)]. When locusts in the solitary phase were reared continuously under crowded conditions (2,000 hoppers or 150 adults in a cage 38 × 38 × 52 cm. in size), the mean number of ovarioles per female progeny fell from 196 to 153 and the mean hatchling weight increased from 10·2 to 16·5 mg. in three generations. The effects of crowding were greatest in the second generation, however, in which the mean number of ovarioles and the hatchling weight were 135 and 17·7 mg., respectively. The inverse relation between these two characters was also shown in progeny from the same egg-pod. In general, the number of ovarioles in the female progeny was more variable, especially when the parent females were crowded, than in *L. m. migratorioides* [*cf.* **48** 500]. In the field, a female of *N. septemfasciata* rarely lays more than 2–3 egg-pods, but, in the laboratory, the average was 6·6 under solitary and 5·9 under crowded conditions, and the corresponding percentages of non-functional ovarioles were 25 and 37, respectively.

Less dense crowding (ten hoppers or adults in a cage 12 l. (0·416 cu. ft.) in size) produced relatively slight effects [*cf.* **48** 501]. The ovariole number of the progeny of females from a solitary stock differed little when the females were kept in isolation or at low density throughout their life or as adults only, but hatchling weight was increased. In the progeny of females from a stock densely crowded in the two previous generations, the ovariole number was increased and the hatchling weight reduced by small amounts when the females were isolated as hoppers and crowded at low density as adults and by rather more when they were slightly crowded as hoppers and isolated as adults, and both ovariole number and hatchling weight approached those characteristic of solitary populations when the females were isolated throughout their life; under the last conditions, there were fewer non-functional ovarioles in the female progeny, which deposited as many as 9·7 egg-pods per female. In general, crowding in the hopper stage appears to be of considerably less importance in modifying the reproductive potential of locusts than in the adult, and it appears that, when populations of *N. septemfasciata* from a crowded stock are isolated, the mean ovariole number and hatchling weight characteristic of solitary populations are reached in two generations. The number of ovarioles in the progeny of ageing females decreased progressively, even when the latter were not crowded.

It is concluded that populations of *N. septemfasciata* present the greatest economic threat when they have increased suddenly over one generation, since the reproductive potential will not decrease until the second generation of crowding.

DAVEY (J. T.). **The African migratory locust (*Locusta migratoria migratorioides* Rch. & Frm., Orth.) in the Central Niger Delta. Part one. Climate and vegetation.**—*Locusta* no. 5 (1957), 115 pp., 24 pls., 16 figs., 2 maps, 25 refs. Nogent-sur-Marne, 1958. **Part two. The ecology of *Locusta* in the semi-arid lands and seasonal movements of populations.**—*Op. cit.* no. 7, 180 pp., 24 figs., 127 refs. 1959. (With summaries in French.)

The first part of this paper on the ecology of *Locusta migratoria migratorioides* (R. & F.) in its outbreak area in the Central Niger delta region of Mali (French Sudan) contains short accounts of the topography, soils and economic use of the area and very much more detailed ones of its climate and plant associations. The following is largely based on the author's summary of the second part, which contains the results of observations in 1952–57 on the life-cycle and seasonal migration of one of the generations of the locust.

Three generations are produced during the year, and two of these develop on the flood-plains. The remaining one, here dealt with and referred to as the Sahelian generation, develops during the monsoon rains (May or June–October) on the higher ground that is not flooded and on the semi-arid land outside the outbreak area. In June and July, adults apparently arriving from the flood-plains and showing characters typical of the solitary phase appeared on the adjoining semi-arid lands, where they dispersed widely, though most congregated in a belt extending about 25–30 miles from the edge of the floods. In this belt, both hoppers and adults showed a preference for fallow or abandoned farmland and rarely colonised other plant associations. The degree of sexual maturity among the adults on arrival and the proportion of the females that oviposited before the end of the rains varied considerably from year to year. Oviposition appeared not to be confined to any particular type of site on the abandoned land and was at a peak from early to mid-September. Hoppers were most numerous towards the end of October, and their rate of development was related to temperature and humidity. Their density varied from 1 per sq. m. to 1 per 100 sq. m., but was not proportional to the density of the adults to which they gave rise, since these tended to leave the area soon after adult emergence. Adults were most numerous in early November, and in 1951–56 maximum densities varied from 1 to 100 per 100 paces. The final number of adults of this generation is affected by the number of immigrant parents and their date of arrival, the number of females that oviposit and the date of oviposition, and the survival rates of eggs, hoppers and adults. Hopper densities appeared to be exceptionally high when the September rains were good and a high proportion of females had oviposited before the middle of the month. Survival rates were affected by climatic factors, chiefly desiccation through various causes. Very few parasites were reared, but predacious birds were numerous and may cause severe losses among hoppers; large numbers of hoppers were occasionally destroyed by bush fires. Mating was frequently observed, but there was no further ovarian development before the locusts left the semi-arid lands. Spontaneous flight was not observed by day, but may occur at night.

The adults declined in numbers in early November and had often disappeared by mid-December; they probably leave because of intense desiccation. Departure appeared to be related to the physical state of the locusts, since high proportions of the older individuals and of females left first. As the population decreased, those on the southern flood-plains increased, and it is concluded that all but a few of the locusts from the semi-arid lands arrive on the plains. Flight appeared to be induced by temperatures slightly higher and relative humidities slightly lower than usual, or both, accompanying a local offshore night breeze associated with the presence of flood waters. The general direction of migration appeared to be southward, apparently because the prevailing winds are from northerly directions and their speed is often greater than that of the flying locusts, and the offshore breeze also favours migration from both sides towards the plains.

Tunstall (J. P.), Sweeney (R. C. H.) & Matthews (G. A.). **Cotton insect pest investigations in the Federation of Rhodesia and Nyasaland. Part I. Cotton bollworm investigations.**—*Emp. Cott. Gr. Rev.* **36** no. 4 pp. 268–275, 2 pls., 5 refs. London, 1959.

Sweeney (R. C. H.). **Part II. Cotton stainer investigations.**—*Op. cit.* **37** no. 1 pp. 32–44, 1 pl., 6 refs. London, 1960.

In the first part of this paper, the authors review the main cotton-growing areas of Nyasaland and Southern Rhodesia, the institution of experimental plots in Northern Rhodesia and the results of investigations carried out since 1956 on the bionomics and control of *Diparopsis castanea* Hmps., one of the principal pests of the crop. A policy of early sowing and uprooting to avoid the formation of overwintering pupae [*cf. R.A.E.*, A **34** 332] was instituted in parts of Nyasaland in 1952 and has apparently given fair results in the Lower River area, though not in the Central Province. In Southern Rhodesia, a few of the overwintering pupae were found to pass two winters before giving rise to adults, so that a policy of growing cotton only every second year is open to question. Mortality of overwintering pupae is high at the onset of the rains, and predators, probably including the ant, *Dorylus conradti* Emery, appear to be mainly responsible. There is also considerable loss of eggs, especially at night. Endrin shows promise for control, and eight weekly spray applications of 0·25 lb. in 10 gal. water per acre substantially increased the yield, though an increase in infestation late in the season was not prevented.

In the second part, it is stated that, of the four species of *Dysdercus* that occur on cotton in Nyasaland, *D. intermedius* Dist. is usually the most numerous, though it may be outnumbered locally in some months by *D. fasciatus* Sign.; *D. nigrofasciatus* Stål is comparatively uncommon, and *D. superstitiosus* (F.) of no importance. In Southern Rhodesia, *D. fasciatus* predominates, *D. superstitiosus* is of more and *D. intermedius* of less importance than in Nyasaland, and *D. nigrofasciatus* is comparatively rare. All four occur in Northern Rhodesia, *D. superstitiosus* and *D. fasciatus* being the most important. Observations on the plants on which breeding occurs are described, and a table showing them is appended, with locality records. In Nyasaland, all stages are attacked by predators, of which the most important is the Reduviid, *Phonoctonus nigrofasciatus* Stål, though it is not specific to *Dysdercus* and is slow to follow its hosts as they migrate from one food-plant to another. The possiblities of control by the destruction of alternative food-plants and the use of persistent insecticides are discussed.

Green (A. A.). **The control of insects infesting groundnuts after harvest in the Gambia. I. A study of the groundnut borer** *Caryedon gonagra* **(F.) under field conditions.**—*Trop. Sci.* **1** no. 3 pp. 200–205, 2 pls., 7 refs. London, 1959.

The following is substantially the author's summary. The behaviour and life-history of *Caryedon gonagra* (F.) in stored groundnuts was investigated under natural conditions in the Gambia. The initial infestation occurs at some stage shortly after harvest. Beetles that had survived the rainy season were found in village and traders' stores and in old sacks. The insect was shown to live and breed only within a few inches of the surface of a bulk of nuts, and a complete life-cycle appeared to take 5–6 weeks. Possible methods of control are discussed.

Parkin (E. A.) & Scott (E. I. C.). **The germination of food-crop seeds stored in contact with lindane and DDT dusts.**—*Trop. Sci.* **1** no. 3 pp. 206–211, 6 refs. London, 1959.

The following is virtually the authors' summary. Seeds of maize, beans, groundnuts and rice were dusted with up to 100 parts DDT or 40 parts lindane [almost pure γ BHC] per million and stored in closed jars at about 22°C. [71·6°F.]. Samples withdrawn after 4·5, 9 and 18 months showed no reduction in percentage germination attributable to the treatments. Examination of seedlings revealed no major changes in growth.

David (W. A. L.) & Gardiner (B. O. C.). **The mating behaviour of** *Pieris brassicae* **(L.) in a laboratory culture.**—*Bull. ent. Res.* **52** pt. 2 pp. 263–280, 3 graphs, 5 refs. London, 1961.

The following is based almost entirely on the authors' summary. As part of a general study of the conditions required for satisfactory maintenance of *Pieris brassicae* (L.) in laboratory culture, the factors affecting mating behaviour were investigated [*cf. R.A.E.*, A **41** 5]. Notes are given on the appearance, size, weight, life-span and sex ratio of adults of the culture from which the experimental material was drawn. Adults over one day old mated readily at temperatures between 20 and 32°C. [68 and 89·6°F.], provided that the daylight illumination was above about 200 lumens per sq. ft., especially at the higher temperatures and illumination levels. Mating was depressed at very high atmospheric humidities. The size of the cage in which the insects were kept was not critical, and pairs formed readily in cages as small as 1 cu. ft. The population density in the cage was also varied over wide limits without significantly influencing the rate at which pairs formed. Mating took place much less readily in the artificial lights that were tested than in daylight. The most satisfactory light was found to be provided by bilaterally arranged 'daylight'-type fluorescent lamps. The level of mating in this light would probably have been sufficient to maintain a culture, but it was far lower than in daylight of the same intensity. After mating, the females did not usually pair again for five or more days. The males, however, mated more frequently and often paired several times in the same day.

Dobson (R. M.). **Observations on natural mortality, parasites and predators of wheat bulb fly,** *Leptohylemyia coarctata* **(Fall.)**.—*Bull. ent. Res.* **52** pt. 2 pp. 281–291, 3 graphs, 33 refs. London, 1961.

The following is based on the author's summary. Observations in eastern England in 1957–59 showed natural mortality of pupae of *Hylemyia* (*Leptohylemyia*) *coarctata* (Fall.) to be high, and the part due to parasitism is considered in this paper in some detail. At Rothamsted, the main parasite was *Trybliographa spaniandra* Kerrich & Quinlan [*R.A.E.*, A **49** 434], and this Cynipid affected about 10 per cent. of the pupae from a crop of wheat in 1957 and about 5 per cent. in 1958. At Whittlesey and Peterborough, in 1959, parasitism affected 5·5 and 13·7 per cent. of the pupae, respectively. The two main species found there were the Staphylinids, *Aleochara bipustulata* (L.) and *A. inconspicua* Aubé. An Ichneumonid, *Phygadeuon trichops* Thoms., also occurred, but was much less frequent. Notes on the bionomics of the parasites are given, based on the literature and the author's observations. Several insects and other small arthropods preyed on various stages of *H. coarctata* in laboratory tests, and notes, based partly on the literature, are given on the feeding habits of some of them.

Ashby (K. R.). **The life-history and reproductive potential of** *Cryptolestes pusillus* **(Schönherr) (Col., Cucujidae) at high temperatures and humidities.**—*Bull. ent. Res.* **52** pt. 2 pp. 353–361, 3 graphs, 9 refs. London, 1961.

The following is substantially the author's summary of this account of the results of studies of the development of *Cryptolestes pusillus* (Schönh.) at various combinations of high temperatures and humidities [*cf. R.A.E.*, A **37** 327]. Larval development was much more rapid at 90 than at 70 per cent. relative humidity, and the optimal temperature is probably about 37°C. [98·6°F.]. Under optimal conditions, the developmental period was less than has been recorded for other species of *Cryptolestes*, the mean duration of the larval stage being as little as 8½ days at 33°C. [91·4°F.] and 90 per cent. relative humidity. The oviposition rate was similarly much increased at both high temperatures and high humidities. There was evidence that middle-aged females oviposit more rapidly than either younger or older ones. Under optimal conditions, the average oviposition rate can exceed seven eggs per female per day, which represents about 17 per cent. of the weight of the adult. In cultures of adults on flour, there was no clear indication of a reduction of the oviposition rate or of a juvenile mortality at densities that provided 1·5–0·03 g. flour per adult, but there were signs that the latter density was near a critical value. When eggs of *C. pusillus* were transferred to whole English wheat with the germs in poor condition, at relative humidities of 50–90 per cent., the larvae preferred the endosperm to the germ in almost all cases. At 50 per cent. relative humidity, only one of 21 individuals completed its development, whereas at 90 per cent. relative humidity few failed to do so. Humidity had a considerable effect on the rate of larval development, which at 90 per cent. relative humidity was only slightly slower on grain than on flour.

ASHBY (K. R.). **The population dynamics of** *Cryptolestes ferrugineus* **(Stephens) (Col., Cucujidae) in flour and on Manitoba wheat.**—*Bull. ent. Res.* **52** pt. 2 pp. 363–379, 4 graphs, 16 refs. London, 1961.

The following is based almost entirely on the author's summary of the results of the laboratory experiments here described. If adults of *Cryptolestes ferrugineus* (Steph.), of which the females have been fertilised, are cultured on flour at low densities, the rate of oviposition is independent of the density of adults and juvenile mortality is negligible. At high densities, there is a heavy mortality among eggs and young larvae, and there is evidence that, providing no great reduction in the amount of suitable food (fine particles) in the medium has occurred, an equilibrium is reached at which the combined number of eggs and larvae present at any time is independent of adult density. Cannibalism is undoubtedly a major cause of the juvenile mortality under these conditions. Where adult crowding is so great that loss of fine particles from the medium becomes important, the combined number of eggs and larvae present at a given time decreases with increasing adult density, and there is some indication of an inverse linear relation.

Cultures on a mixture, conditioned to 70 per cent. relative humidity, of sound grain and grain already slightly damaged by *Cryptolestes* resulted in dense infestations in the laboratory, at least at moderate and high temperatures. Under optimal conditions, the infestations develop within 15 days. Values deduced for the pre-adult period at various temperatures were similar to those obtained by Rilett [*R.A.E.*, A **38** 159]. At 17°C. [62·6°F.], development was extremely slow but the low temperature did not increase mortality. Cannibalism and competition by adults and fully developed larvae appear to play an important part in limiting the production and survival of the juvenile stages. Sound grain at 70 per cent. relative humidity is unsuitable as a medium for culturing *Cryptolestes*, but becomes suitable after relatively small additions of flour and damaged grains. At 33°C. [91·4°F.], at least, they are immediately followed by initiation of an infestation, the critical features being increased survival of larvae rather than increased oviposition. An increase in humidity produces a similar effect.

Estimates of the production of carbon dioxide at various temperatures gave values higher than those reported by Howe & Oxley [**32** 243]. Between 21 and 33°C. [69·8 and 91·4°F.], the increases in the rates of respiration and development are proportional to rise in temperature. This is in accord with other indications that *C. ferrugineus* has a high optimum temperature.

Sawicki (R. M.) & Thain (E. M.). **Chemical and biological examination of commercial pyrethrum extracts for insecticidal constituents.**—*J. Sci. Fd Agric.* **12** no. 2 pp. 137–145, 3 graphs, 15 refs. London, 1961.

The following is virtually the authors' summary. Samples of three commercial pyrethrum extracts were examined chemically and biologically (by topical application to adults of *Musca domestica* L.) to determine the number of insecticidal constituents they contain. These constituents, which were completely removed from commercial pyrethrum extract by exhaustive extraction with nitromethane, were separated by displacement chromatography. The insecticidal activity of the eluate was restricted to fractions identified chemically as cinerin I, pyrethrin I, cinerin II and pyrethrin II. Solutions containing the four pure active constituents in the same ratios as in the three commercial extracts had the same activity as the corresponding extracts. Pyrethrin II was more active than pyrethrin I, but the cinerins were much less active. If any other insecticidal constituent occurs in commercial pyrethrum extract, its contribution to the total activity is negligible.

Davey (P. M.) & Amos (T. G.). **Testing of paper and other sack materials for penetration by insects which infest stored products.**—*J. Sci. Fd Agric.* **12** no. 3 pp. 177–187, 1 fig., 14 refs. London, 1961.

Seven types of materials (jute twills, Kraft papers, Kraft paper laminated with polyethylene, bitumen-union Kraft papers, crêped Kraft and waxed papers, polyethylene and polyethylene terephthalate) used for the storage of food products such as maize and groundnuts were tested for penetration by some or all of nine species of insects that infest such produce. The relative protective values of the materials were determined, and recommendations are made as to suitable materials for use in certain cases and the procedure that should be followed in storing produce. None of the materials resisted penetration by all the insects, though some afforded protection for a month or more, and all materials were penetrated by adults of *Rhyzopertha dominica* (F.). The use of multi-ply Kraft paper as sacks or as lining for jute sacks is recommended against *Tribolium castaneum* (Hbst.) and *Sitophilus oryzae* (L.), and of 0·005-in. polyethylene as a sack lining for the protection of malting barley.

Miller (B. S.) & Halton (P.). **The damage to wheat kernels caused by the wheat blossom midge** (*Sitodiplosis mosellana*).—*J. Sci. Fd Agric.* **12** no. 5 pp. 391–398, 7 figs., 11 refs. London, 1961.

The following is virtually the authors' summary of the results of investigations in Britain on the nature of the damage caused to the grains of wheat by *Sitodiplosis mosellana* (Géh.). Attack by *S. mosellana* decreased germination capacity, bushel weight and flour yield of wheat. The ash of the flour increased slightly, and its maltose and colour grade values increased greatly. α-Amylase and protease increased only in proportion to the decrease of kernel weight and was not related to the extremely large increase in number of fungi and bacteria occurring on and in attacked grains. The water absorption, extensometer resistance and extensometer extensibility values all decreased greatly in doughs made from flour milled from attacked grain. The loaves made from such flour were inferior to others in outside colour, nature of the crumb and loaf volume. Blending the flour milled from attacked grain with flour from a good-quality wheat lowered the bread-making quality of the latter. Experimental evidence indicated that increased α-amylase and protease activities were not the causes of the poor quality of infested grain, which seem likely to result from the failure of protein to develop properly.

MISSONNIER (J.). **Essais de lutte contre la mouche de la betterave** (*Pegomyia betae* **Curtis—Diptères Muscidae**).—*Ann. Épiphyt.* **10** no. 1 pp. 19–36, 3 graphs, 23 refs. Paris, 1959.

Pegomyia betae (Curt.) is a common pest of beet in northern France. It has three generations a year, and the investigations described were concerned with the control of the first, which is the only one of importance [*cf. R.A.E.*, A **46** 194]. Insecticides were tested in sprays against the larvae in 1957 and 1958, and it was found that the best, in order of decreasing effectiveness, were parathion, diazinon, Chlorthion, endothion, azinphos-methyl (Gusathion), trichlorphon (Dipterex), a mixture of trichlorphon and Chlorthion, chlordane, dieldrin, heptachlor and a mixture of diazinon and DDT. It is concluded that, if infestation was heavy in the previous summer and autumn, seedlings should be sprayed with a rapidly acting insecticide as soon as hatching begins in spring, older plants with a very persistent insecticide, and seed crops, on which treatment can be delayed if necessary, also with a persistent material. If infestation is less severe, treatment can be delayed on well-developed plants until the appearance of large larvae, when a powerful early treatment is still required on seedlings. Control depends more on the correct date of application than on the insecticide applied, provided that it is toxic to the larvae.

BONNEMAISON (L.). **Le puceron cendré du pommier** (*Dysaphis plantaginea* **Pass.**). **Morphologie et biologie. Méthodes de lutte.**—*Ann. Épiphyt.* **10** no. 3 pp. 257–320, 24 figs., 3½ pp. refs. Paris, 1959.

The author reviews the nomenclature of the rosy apple aphid, *Anuraphis roseus* Baker, for which he considers the correct name to be *Dysaphis plantaginea* (Pass.), describes all its various forms, and records observations on its bionomics and control carried out in northern France, with reference to the literature. The following is based on his summary of the results.

The primary food-plant of *A. roseus* is apple, and its secondary food-plants are species of *Plantago*. In the Paris region, hatching of the winter eggs on apple begins between mid-March and 10th April, according to the weather in February–March, and the fundatrices live for 22 days and produce an average of 72 fundatrigeniae each. The latter are all apterous, but alates appear in the subsequent generations, of which there may be up to five. Migration begins between early May and the beginning of June and terminates in mid- or late July. From three to eight generations develop on *Plantago*. Apterous sexuparae appear from mid-July and give rise to apterous sexuparae, alate sexuparae and finally males. The alate sexuparae become adult from the first ten days of September, and adults form 95 per cent. of the population at the end of that month, but the return migration to apple is not completed until November. The winged sexuparae produce an average of 9·2 progeny each and are very resistant to starvation. The oviparae become adult about mid-October and lay 4–5 winter eggs at the base or in cracks in the epidermis of the buds.

Migration appears to be obligatory in France, and sexual reproduction was not suppressed by parthenogenetic rearing for 9½ years. The size of the population depends on various factors, and rain during the two periods of migration kills many of the alates; heavy rain also reduces the numbers on *Plantago*. The number of winter eggs laid on the buds depends on the date and the rate of leaf-drop. The oviparae do not move to the twigs until they are ready to oviposit, and varieties of apple on which the leaves drop early are therefore less infested than others. Strong autumn winds that accelerate leaf-drop also reduce the number of winter eggs laid. Some control is afforded by natural enemies, of which the most important are Coccinellids and Syrphids. Hymenopterous parasites, of which *Ephedrus plagiator* (Nees), *Aphidius arundinis* Hal. and *Lipolexis gracilis* Först. were observed, were of little significance.

Sprays of tar distillate, DNC or the last in oil emulsion applied at the end of the dormant season gave insufficient kill of winter eggs to be used against *Anuraphis* alone, but control other pests and are therefore of general value. Parathion in oil emulsion (oleoparathion [*cf. R.A.E.*, A **46** 396]) at 0·04–0·05 per cent. toxicant are effective against the eggs of *A. roseus* and other pests when applied at bud-burst. Summer treatments are not very effective because of the curling of the leaves caused by *A. roseus*, but spring treatments with contact insecticides when the first fundatrices reach the fourth or fifth instar gave good results. The materials that proved effective, in order of decreasing control, were oleoparathion at 0·015 per cent. parathion, parathion in 0·02 per cent. suspension and diazinon at 0·02 per cent., which were equally effective, parathion in emulsified solution at 0·015 per cent., γ BHC (lindane) in emulsified solution at 0·03 per cent., Isolan at 0·006 per cent., malathion at 0·075 per cent. and endrin at 0·035 per cent. Systemic insecticides should not be applied until the leaves have expanded sufficiently to permit satisfactory spray deposits; methyl-demeton at 0·05 and endothion at 0·04 per cent. gave good results [*cf.* **46** 139].

Coutin (R.). **Étude expérimentale sur les captures d'imagos de** *Laspeyresia pomonella* **L. par des pots-pièges-appâts.**—*Ann. Épiphyt.* **10** no. 3 pp. 351–367, 4 figs., 22 refs. Paris, 1959.

The author describes investigations carried out in the laboratory and in an apple orchard near Paris on the value of bait-traps for determining the spring emergence of adults of *Cydia* (*Laspeyresia*) *pomonella* (L.). The laboratory tests on the attractiveness of baits (honey solution and diluted pear juice) gave somewhat inconclusive results, and the field tests, which were carried out by release and recapture of marked moths, showed that the method was of little use by itself, since the adults dispersed irregularly and captures seemed to occur largely by chance, so that no estimate of population was possible.

Guennelon (G.). **Le problème des cétoines grises dans la basse vallée du Rhône.**—*Ann. Épiphyt.* **10** no. 3 pp. 369–406, 12 figs., 69 refs. Paris, 1959.

Fruit trees, particularly apple and pear, in the region of Avignon are damaged by the adults of *Epicometis hirta* (Poda), *Tropinota* (*E.*) *squalida* (Scop.) and *Oxythyrea funesta* (Poda), which feed on the flowers. The loss is not always serious, but the complete crop is sometimes destroyed in small orchards. The author describes the adults of the three species, reviews their distribution and synonymy and the damage caused and numerous plants attacked by these Cetoniids, and records observations on their bionomics and control. The adults are active from mid-March to mid-July and feed and pair in the flowers, hiding in the soil by night or in cool, rainy or windy weather. The eggs are apparently laid in the soil, and the larvae are of no economic importance. Details of the life-cycle of *T. squalida*, the commonest of the three, are recorded from laboratory and field observations; there was only one generation a year, and the adults overwintered, leaving the pupal cells before doing so in some years. Control is by mechanical methods, such as trapping the adults or protecting the crowns of the trees, and by means of sprays. Several of the latter were tested by caging adults with sprayed flowers, and the best results were given by parathion, aldrin, dieldrin and BHC, all of which, however, are toxic to honey bees.

COUTIN (R.). **Quelques particularités du cycle évolutif des cécidomyies. La diapause prolongée des larves et l'apparition différée des imagos.**—*Ann. Épiphyt.* **10** (1959) no. 4 pp. 491–500, 6 figs., 11 refs. Paris, 1960.

Numerous Cecidomyiids under a prolonged diapause in the larval stage, and the phenomenon was studied in France in three species of *Contarinia* that attack the floral organs of their food-plants, *C. pyrivora* (Ril.) on pear, *C. pruniflorum* Coutin & Rambier on plum and *C. medicaginis* Kieff. on lucerne. Infested inflorescences were collected and emergence of adults recorded directly or after observations on the entry of the larvae into the soil for cocoon formation. The first two species have only one generation a year. Larvae of *C. pyrivora* seldom passed more than one year in the soil, though emergence occurred in some instances after two years and in one case after three. Larvae of *C. pruniflorum*, which develop in the flower buds of plum, preventing them from opening, and pupate in September, sometimes passed one year in the soil, but most pupated without diapause. *C. medicaginis* has several generations a year and overwinters as larvae in cocoons. Some larvae of each generation entered diapause, the proportion increasing as the season advanced, but pupation occurred invariably in the succeeding spring.

FELTZ (H.) & MARX (R.). **Der Tausendfüssler** *Blaniulus guttulatus* **Bosc. als Zuckerrübenschädling.** [*B. guttulatus* as a pest of sugar-beet.]—*NachrBl. dtsch. PflSchDienst* **11** no. 2 pp. 27–28, 3 figs., 17 refs. Stuttgart, 1959. (With a summary in English.)

Damage to sugar-beet by *Blaniulus guttulatus* (Bosc) occurred in 1955–57 near Mannheim, western Germany. In 1955, when the weather was cool and dry, it occurred in particularly damp places, and in 1957, when it followed cool, wet weather, it occurred in a dry district. Insecticidal seed dressings and application of lime before sowing are recommended for control.

WINNER (C.). **Schäden an Zuckerrüben durch** *Onychiurus campatus* **Gis. (Collembola).** [Injuries to sugar-beet by *O. campatus*.]—*NachrBl. dtsch. PflSchDienst* **11** no. 5 pp. 67–69, 2 figs., 9 refs. Stuttgart, 1959.

Subterranean damage to sugar-beet by *Onychiurus campatus* Gisin, which is one of a number of species formerly included in *O. armatus* (Tullb.), occurred in the spring of 1958 near Göttingen, the swelling seeds and sometimes the newly-formed roots being injured. The insects are briefly described. Damp weather may have been a cause of the attack, which was greatest in loose soil.

Mayer (K.). **Die Ursachen der Insektizidresistenz und Wege zu ihrer Verhütung.** [The causes of resistance to insecticides and ways of preventing it.]—*NachrBl. dtsch. PflSchDienst* **11** no. 5 pp. 72–75, 26 refs. Stuttgart, 1959. (With a summary in English.) [English translation available.]

The following is virtually the author's summary. Resistance of insects to insecticides is a result of evolution that has taken place following changes of environment due to chemical control. The forms of resistance comprise physiological resistance, vigour tolerance and behaviouristic resistance, all produced genetically or phenotypically in the biocoenosis through a process of selection of preadaptations. This process is not so much influenced by the type of insecticide as by the mode of its application, which is determined by economic points of view. The extent and frequency of treatment with the same insecticide determine the intensity and permanence of the selection pressure, and a parallel process accompanies other kinds of control measures. To prevent the development of resistant strains, it is necessary to avoid frequent treatments of great areas with the same insecticide, to use numerous chemical pesticides fitting different ecological conditions and to change the kind of control measures frequently or to combine different methods.

Godan (D.). *Mymar autumnalis* (**Foerst.**) (*Anaphes autumnalis* **Foerst.**) (**Chalcidoidea, Mymar.**), **ein bisher unbekannter Eiparasit des Kohlschotenrüsslers.** [*M. autumnalis*, a hitherto unknown egg-parasite of *Ceuthorhynchus assimilis*.]—*NachrBl. dtsch. PflSchDienst* **11** no. 11 pp. 161–164, 3 figs., 29 refs. Stuttgart, 1959. (With a summary in English.)

Up to 90 per cent of the eggs of *Ceutorhynchus assimilis* (Payk.) laid on summer rape and turnip rape near Berlin in 1952 were found to be parasitised in the first half of July by *Mymar autumnalis* (Först.). The known hosts of species of *Mymar* (*Anaphes*) are listed from the literature. The adult parasites evidently entered the pods in late June or early July through the oviposition holes of the host, and their progeny became adult by mid-July and left the pods either when these had already burst or by boring an exit. *M. autumnalis* was not previously known to parasitise *C. assimilis* and was not found in subsequent years.

Musolff (W.). **Die Beobachtung der Verteilung von Fritfliegen über Getreide unter Verwendung von Farbschalen.** [Observation on the distribution of the frit fly on cereals using coloured dishes.]—*NachrBl. dtsch. PflSchDienst* **11** no. 11 pp. 164–165. Stuttgart, 1959. (With a summary in English.)

During investigations on the distribution of *Oscinella frit* (L.) and other Chloropids on cereals near Berlin, water-filled blue dishes were found to be very attractive to the adults of *O. frit* and more so than were those of other colours, including yellow [*cf. R.A.E.*, A **49** 331], when the catches were made over oats. Blue was still preferred but attracted few adults over rye or barley. The results of the trapping showed that large numbers of adults of *O. frit* were present on oats from the beginning of May, with smaller numbers on other grains. Numbers on oats decreased greatly at the end of July, and the insects were then found, in association with other Chloropids, on wild grasses, on which, however, no larvae of *O. frit* were observed.

Szmidt (A.). **Die Wirtswahl von** *Dahlbominus fuscipennis* **(Zett.) (Hym., Chalcididae) und die Eignung des Wirtes für den Parasiten.** [Host selection by *D. fuscipennis* and the suitability of the host for the parasite.]—*Anz. Schädlingsk.* **33** pt. 2 pp. 20–22, 1 fig., 4 refs. Berlin, 1960.

Tests on the factors influencing host selection by *Dahlbominus fuscipennis* (Zett.) indicated that avoidance of cocoons of *Gilpinia frutetorum* (F.) that already contained parasite larvae was due not to olfactory perception, but presumably to some mechanical cause [*cf. R.A.E.*, A **24** 548]. The primary factor affecting selection of the host in preference to other species was the structure of the cocoon, but, although the host larva exercised little or no chemical influence over the parasite, some degree of recognition was afforded by contact of the ovipositor with it. Development was not possible on an unparalysed host.

Schefer-Immel (V.). *Phyllocnistis suffusella* **Z. und** *Phytomyza (Phytagromyza) populi* **Kltb., zwei blattminierende Pappelschädlinge.** [*Phyllocnistis suffusella* and *Phytagromyza populi*, two leaf-mining pests of poplar.]—*Anz. Schädlingsk.* **33** pt. 2 pp. 22–24, 8 figs., 5 refs. Berlin, 1960.

In 1958–59, serious damage was caused to the leaves of poplar by *Phyllocnistis suffusella* Zell. in the Rhine-Main region of Germany and some in the Hanover region (trees up to 12 years of age being attacked); generally slight damage by *Phytagromyza (Phytomyza) populi* (Kalt.) occurred in the same regions. The larva and pupa of *Phyllocnistis* and the larva and puparium of *Phytomyza* are described and notes are given on the bionomics of both leaf-miners.

Schütte (F.). **Vogelschutz und Eichenwickler. Zur Problematik.** [On the problem of bird protection and *Tortrix viridana*.]—*Anz. Schädlingsk.* **33** pt. 3 pp. 33–41, 7 graphs, 17 refs. Berlin, 1960.

An account is given of investigations carried out in 20 pairs of oak stands in several parts of Germany in 1951–58 [*cf. R.A.E.*, A **47** 493] on the effectiveness in reducing the damage caused by *Tortrix viridana* (L.) of artificially increasing the bird population by means of nesting boxes. The results are recorded in detail, and the following is taken from the author's discussion of them. The effectiveness of birds increased in proportion to their numbers, but this was much less important than the population density of the pest. Birds were most effective when the *Tortrix* population was such as to cause about 50 per cent. defoliation, and both their actual and their relative effects were diminished when the population was either higher or lower than this.

Bachmann (F.). **Über die insektizide Wirkung von DDVP (O,O-Dimethyl-2,2-dichlorvinylphosphat).** [On the insecticidal effect of dichlorvos.]—*Anz. Schädlingsk.* **33** pt. 3 pp. 41–44, 3 graphs, 17 refs. Berlin, 1960. (With a summary in English.)

The characteristics of dichlorvos (DDVP) and its advantages as an insecticide are reviewed with reference to the literature. In tests to compare its effect following topical application with that of other synthetic insecticides, the approximate LD50's of dichlorvos applied in kerosene solution were

0·005 µg. for *Musca domestica* L., 0·02 µg. for *Calliphora vicina* R.-D. (*erythrocephala* (Mg.)), 0·5 µg. for *Carausius morosus* Brunn. and 0·15 µg. for *Melolontha melolontha* (L.) (*vulgaris* F.), and dichlorvos was more toxic than diazinon, γ BHC (lindane), aldrin, parathion or DDT. In tests with aerosols, complete mortality of *M. domestica* occurred in 11½ and 14–18 minutes in a closed chamber in which dichlorvos was released at 2·3 and 1·3 mg. per cu. m., respectively, and when several insects were exposed for one second to a direct spray of an aerosol formulation containing 0·4 per cent. dichlorvos released at a distance of about 20 in. in an unconfined space, adults and larvae of *Dermestes lardarius* L. and adults of *Blatta orientalis* L. and *Tribolium castaneum* (Hbst.) were moribund and larvae of *Anagasta* (*Ephestia*) *kühniella* (Zell.) and *Tenebrio molitor* L., paralysed after an hour and all but the last dead or moribund after 1½ hours, whereas a 2 per cent. DDT aerosol required about 16 hours for a similar effect.

Prilop (H.). **Zur Frage der holozyklischen Überwinterung der Kreuzdornblattlaus** *Aphis nasturtii* **Kalt.** (=*A. rhamni* **Koch**) **auf dem Faulbaum** *Frangula alnus* **Miller** (=*Rhamnus frangula* **L.**). [On the question of the holocyclic overwintering of *A. nasturtii* on *Frangula alnus*.]—*Anz. Schädlingsk.* **33** pt. 4 pp. 49–54, 1 fig., 52 refs. Berlin, 1960. (With a summary in English.)

The tobacco vein-browning strain of the Y virus has spread on potato in Lower Saxony in recent years. *Aphis nasturtii* Kalt. is the commonest of its aphid vectors, but as its principal winter food-plants, which are species of *Rhamnus*, particularly *R. cathartica*, are uncommon in the area, the origin of the spring population on potato was uncertain. *Frangula alnus* has been recorded as a winter food-plant in various countries [*cf. R.A.E.*, A **31** 386] and is common in parts of north-western Germany. Tests of its suitability as a primary food-plant were therefore made, and complete development from winter eggs to spring migrants was obtained in rearing cages, though mortality of fundatrigeniae was sometimes high. Gynoparae preferred *R. cathartica* to *F. alnus*, but development of oviparae was completed, though with some delay, and pairing and oviposition occurred. *A. nasturtii* was found sporadically on *F. alnus* in the field, but hibernation and development of spring migrants was observed at one locality only.

Jancke (G. D.). **Die Nelkenmotte,** *Epichorista ionephela* **Meyr., ein neuer Schädling an Birnen.** [The carnation moth, *E. ionephela*, a new pest on pears.]—*Anz. Schädlingsk.* **33** pt. 4 pp. 54–55, 4 figs., 4 refs. Berlin, 1960. (With a summary in English.)

Damage to the leaves and shoots and superficial injury to the fruits of pear in Western Cape Province, South Africa, has been caused in recent years by larvae of *Epichorista ionephela* Meyr. Descriptive notes are given on the larvae and adults, the food-plants of the Tortricid, of which carnation is the best known, are enumerated and information is given on its bionomics.

Auersch (O.). **Weitere Beobachtungen zum Auftreten des Fruchtschalenwicklers (Apfelschalenwicklers)** *Adoxophyes reticulana* **Hb.** [Further observations on the occurrence of *A. orana*.]—*Anz. Schädlingsk.* **33** pt. 6 pp. 83–87, 11 figs., 4 refs. Berlin, 1960.

Adoxophyes orana (Fisch. v. Roesl.) (*reticulana* (Hb.)) which damaged apple and pear in central Germany in 1958 [*cf. R.A.E.*, A **49** 205], was numerous in Thuringia in 1959. The injury caused to the leaves of apple is described and that to the fruits is compared with the damage resulting from attack by other insects. Investigations showed that the larvae overwinter in concealed sites on the trees, including the fruits themselves, so that winter control would be difficult. On apple fruits, some overwintering larvae were found in the entry holes made by *Cydia* (*Laspeyresia*) *pomonella* (L.). The larvae were attacked in the rolled leaves by several insect predators, of which the most important was *Coccinella septempunctata* L., and altogether 39 per cent. of larvae, pupae and adults were destroyed by parasites, diseases or other factors. Some 20 per cent. of the larvae of the overwintering generation were parasitised by *Colpoclypeus silvestrii* Lucchese. Only 6–8 per cent. of the fruits of apple and pear trees were infested, as compared with 35–70 per cent. in the previous year when parasitism was much lower and the pest was favoured by damper weather; many pupae, and probably also many eggs, were destroyed by drought.

TANNERT (W.). **Zur Frage des Schutzes von Insektensammlungen gegen** *Anthrenus* **spec. (Coleopt.–Dermestidae).** [On the problem of the protection of insect collections against *Anthrenus* sp.]—*Anz. Schädlingsk.* **33** pt. 6 pp. 87–92, 2 figs., 12 refs. Berlin, 1960.

Details are given of tests in which strips of paper bearing BHC, such as are used against some insects in greenhouses, gave promising results for the protection of insect collections from *Anthrenus* larvae, though somewhat slow in action.

OLDIGES (H.). **Der Einfluss der Waldbodendüngung auf das Auftreten von Schadinsekten.** [The influence of forest-floor fertilisation on the occurrence of harmful insects.]—*Z. angew. Ent.* **45** pt. 1 pp. 49–59, 4 graphs, 48 refs. Hamburg, 1959. (With a summary in English.)

Cage tests in Germany in 1957–58 showed that mortality of the larvae of *Lymantria monacha* (L.), *Bupalus piniarius* (L.), *Dendrolimus pini* (L.) and *Panolis flammea* (Schiff.) was considerably higher in pine stands in which the poor soil had been treated in 1956 with fertiliser including a nitrogen salt than in untreated stands and somewhat higher also in those treated with a fertiliser affording the same elements but in which the nitrogen was applied as ammonia gas. Mortality of *B. piniarius* in a stand in which lime had been worked into the soil and ameliorative measures carried out in 1934 was higher than in untreated stands, but there was no increase in stands given similar treatment as recently as 1951.

POSTNER (M.). **Die Bekämpfung der Tannennadelgallmücke** *Agevillea abietis* **Hubault (Cecid. Dipt.) unter Berücksichtigung der Parasitierungsverhältnisse.** [The control of *A. abietis* with reference to parasitism.]—*Z. angew. Ent.* **45** pt. 1 pp. 60–65, 22 refs. Hamburg, 1959. (With a summary in English.)

The Cecidomyiid, *Agevillea abietis* Hubault, which was recorded from southern Germany for the first time in 1954 [*cf. R.A.E.*, A **49** 205], causes serious damage to the needles of silver fir (*Abies alba*) [*cf.* **34** 214] 1–5 years old, sometimes killing the plants; older ones suffer some inhibition of growth. Removal of thick secondary vegetation to improve ventilation is a useful control measure. Parasites of the larvae are sometimes very effective, but they do not prevent serious infestation for two seasons following a period when parasitism is less than 10 per cent. and chemical measures are needed in the interim. In preliminary tests against the larvae on trees five and about 12–15 years old that had been heavily infested since 1956, sprays were applied on 5th August 1958. Examination of twigs on 11th September showed that complete control on the young trees was given by 0·1 per cent. trichlorphon (Dipterex), 0·1 per cent. Basudin [an emulsion concentrate containing 20 per cent. diazinon] and 0·5 per cent. methyl-demeton (Metasystox). Only Basudin and methyl-demeton were completely effective on the older trees. Spraying after the opening of the buds on the May shoots, immediately after oviposition, is recommended.

Györfi (J.). **Beiträge zur Kenntnis der Lebensweise der Engerlinge.** [Contributions to knowledge of the life-history of Lamellicorn larvae.]—*Z. angew. Ent.* **45** pt. 1 pp. 87–93. Hamburg, 1959. (With a summary in English.)

The author lists 25 species of Lamellicorns observed by him in Hungary, reviews the distribution of the three populations of *Melolontha melolontha* (L.) that occur there (all of which have a three-year life-cycle) and points out that there is no year in which a flight period does not occur in some district. Although *M. hippocastani* F., with its four-year cycle, was usually present in only small numbers, it accounted for about 30 per cent. of the *Melolontha* population in some places. It is recorded from general observations that the first-instar larvae are those most susceptible to BHC, that larvae lying less than about a foot below the surface of the soil are not killed by frost, that the larvae show considerable resistance to flooding [*cf. R.A.E.*, A **46** 401], and that many larvae are destroyed by wild pigs.

Schremmer (F.). **Beobachtungen und Untersuchungen über die Insektenfauna der Lärche** (*Larix decidua*) **im östlichen Randgebiet ihrer natürlichen Verbreitung, mit besonderer Berücksichtigung einer Grossstadtlärche. Teil I.** [Observations and investigations on the insect fauna of larch (*L. decidua*) on the eastern edge of its natural area of distribution, with particular reference to a city-growing larch. Part I.] —*Z. angew. Ent.* **45** pt. 1 pp. 1–48, 22 figs. Hamburg, 1959. **Teil II.** [Part II.]—*T. c.* pt. 2 pp. 113–153, 24 figs., 62 refs. (With a summary in English.)

Investigations were carried out, mainly in 1954–56, on the arthropod fauna of larch (*Larix decidua*) in Austria, chiefly in one locality in the south and one in the west of the Wienerwald and one in Styria (in 1956) and also on a single tree in Vienna (which is outside the eastern border of the natural area of distribution of *L. decidua*), in the grounds of the University. The results are discussed in detail, and the species observed are listed in a table, showing the areas in which they occurred. Information on the more important is noticed below.

Severe injury to the needles by *Coleophora laricella* (Hb.) occurred in Styria and, in some years, on the tree in Vienna. It was less common in the Wienerwald. The adults emerged in late May or early June, and feeding by the larvae became important only in the spring, following overwintering (there being only one generation a year). Parasitism in Styria was 2·25 per cent. in heavily infested areas, as compared with 6·6 per cent. in a much less heavily infested one. The most important parasite was *Epilampsis* (*Chrysocharis*) *boops* (Thoms.), which appears not to have been hitherto recorded from *C. laricella*. *Diglyphus rugifrons* (Thoms.) was obtained for the first time from *C. laricella* in both Vienna and the Wienerwald. *Cydia* (*Laspeyresia*) *grunertiana* (Ratz.), which was observed in the south of the Wienerwald in 1955–56, infested trees 10–15 years old (mainly weak ones). The Tortricid fed under the bark of the trunk or larger branches and had one generation a year, the larvae overwintering in their mines and completing their feeding in spring. The larvae were fairly heavily parasitised by *Glypta varicoxa* Thoms., and damage was not great. Injury by *C.* (*L.*) *zebeana* (Ratz.) occurred in the Wienerwald (particularly in the south) on younger trees, on which the gall-formations on the upper trunks sometimes caused severe weakening. *Dasyneura laricis* (Lw.) occurred in many parts of the Wienerwald (where infestation was severe) and in Styria, as well as in Vienna (where numbers were very small). The adults appeared with the formation of the new needles, in the first half of April, and the larvae fed on the vegetative terminal of the short shoots. The resulting gall-formations prevented the growth of new needles in the following year. An unidentified ectoparasite of the genus *Torymus* emerged from a few galls taken in Styria. *Pristiphora* (*Lygaeonematus*) *ambigua* (Fall.) occurred on young trees in the west of the Wienerwald, and this is stated to be the first record of this sawfly on larch, spruce being its usual food-plant. The larvae attacked the needles of the long shoots. Two species of *Chermes*, *C.* (*Adelges*) *laricis* (Vall.) and *C.* (*Sacchiphantes*) *viridis* Ratz., which both have spruce as the primary food-plant, were found (even in Vienna), and their life-cycles (which are similar) are described. Lachnines were common, and the natural enemies of these and the species of *Chermes* are reviewed at some length. *Eriophyes pini laricis* (von Tubeuf) attacked the short shoots in Styria, but was not observed elsewhere. Galled buds were found on shoots 1–3 years old, and characters are given distinguishing these galls from those of *D. laricis*. *Taeniothrips laricivorus* Krat. & Farský occurred in the west of the Wienerwald in 1955–56, in the upper parts of the crowns, but noticeable damage was rare. *Ips cembrae* (Heer) damaged fallen, unbarked trees and also infested some injured standing trees. A large proportion of all the arthropods found in the forest also occurred on the solitary tree, and the variety of the fauna on the latter is discussed.

MAJERNIK (O.). **Über die Schädlichkeit einiger Borkenkäferarten auf der Aprikose** (*Prunus armeniaca* **L.**). [On the harmfulness of some bark-beetles on apricot.]—*Z. angew. Ent.* **45** pt. 2 pp. 198–203, 4 figs., 8 refs. Hamburg, 1959. (With a summary in English.)

Observations in Czechoslovakia showed that a condition causing early death of apricot trees, termed ‘ apoplexy ’, is frequently associated with attack by bark-beetles. Of the two species investigated, *Scolytus* (*Eccoptogaster*) *rugulosus* (Ratz.) was found to occur only in dead or dying trees with a moisture content of not more than 30–35 per cent.; as the moisture content of healthy apricot is generally 30–50 per cent., the beetle is thought to have no connection with the actual cause of death. The other species, *Xyleborus xylographus* (Say) (*Xyleborinus saxeseni* (Ratz.)) was usually found in wood, whether living, dying or dead, of higher moisture content, and a fungus, *Trichoderma lignorum*, was nearly always found in its galleries, in addition to ambrosia fungi. Deep inoculation of apricot twigs with *T. lignorum* caused withering, so that there may be a connection between the occurrence of *X. xylographus* and tree death.

LAMPEL (G.). **Über die Entstehung von Riesenzellen im Abdomen von Pemphiginen bei Schlupfwespenbefall.** [On the formation of giant cells in the abdomen of Pemphigines attacked by Hymenopterous parasites.] —*Z. angew. Ent.* **45** pt. 2 pp. 204–211, 7 figs., 24 refs. Hamburg, 1959. (With a summary in English.)

Fundatrices of *Pemphigus populi-nigrae* (Schr.) and *P. bursarius* (L.) on the leaves of poplar [*Populus nigra*] were found during investigations in Germany to be parasitised by *Polynema schmitzi* (Soyka). This Mymarid, which probably attacked the young nymphs in spring (but possibly the eggs in autumn), continued its development through all subsequent instars of the host, apparently causing the death of at least some of the embryos in the adults. The effect of parasitism, which results in the overgrowth of the oenocytes in the abdomen of the host, is discussed, and it is concluded that the enlarged cells probably produce food for the parasites.

BAKKE (A.). **On the house longhorn beetle,** *Hylotrupes bajulus* **L. (Col. Cerambycidae) in Norway.**—*Norske Skogforsøksv.* no. 56 pp. [3+] 267–279, 4 figs., 18 refs. Vollebekk, 1960. (With a summary in Norwegian.)

Hylotrupes bajulus (L.) has been known in Norway for over 100 years, and its present distribution there is shown on a map and discussed; it now occurs over large parts of the coastal areas of the south of the country, and the damage caused to timbers in buildings is in many places considerable. Telegraph poles are also attacked.

BAKKE (A.). **Insektskader på ubarket gran- og furutømmer i Norge.** [Insects injurious to unbarked spruce and pine timber in Norway.]—*Norske Skogforsøksv.* no. 56 pp. [4+] 285–333, 24 figs., 15 refs. Vollebekk, 1960. (With a summary in English.)

This is a report on investigations on the insects attacking unbarked sawn logs of spruce and pine in various districts in Norway. Numerous Coleoptera were recorded, and the most important was *Monochamus sutor* (L.). In tests of protective sprays, DDT proved inferior to two proprietary products of unspecified composition, but gave fair results.

AGAFONOVA (Z. Ya.). **A new pest of the ovaries of awnless brome grass (Hymenoptera, Chalcidoidea).** [*In Russian.*]—*Rev. Ent. URSS* **38** pt. 2 pp. 348–351, 6 figs., 3 refs. Moscow, 1959.

A species of *Mesopolobus* (*Amblymerus*) close to, if not identical with, *M.* (*A.*) *graminum* (Hårdh) [*cf. R.A.E.*, A **40** 94] was found infesting the seeds of awnless brome grass (*Bromus inermis*) in the Kursk district of the Soviet Union in the autumn of 1956. It overwintered in the larval and occasionally the pupal stage in the fallen seeds, and the adults emerged in the laboratory in mid-April at 17°C. [62·6°F.] and were present in the field from mid-May to September. Larvae appeared at the base of the unfertilised ovaries in early June and fed externally, causing small depressions. They later pupated in cocoons, which were formed before pollination occurred. There were apparently two generations a year, with peaks of abundance at the end of May and in mid-August. *Tetrastichus* sp. was likewise reared from the seeds of *B. inermis* and may be a parasite of *Mesopolobus* or of a Cecidomyiid infesting the immature seeds.

KOMAROVA (O. S.). **The formation of the overwintering population and the diapause of the pupae of the cotton Noctuid.** [*In Russian.*]—*Rev. Ent. URSS* **38** pt. 2 pp. 352–360, 9 refs. Moscow, 1959. (With a summary in English.)

Investigations were made in the field in Soviet Azerbaijan and the Ukraine and in the laboratory at various places in 1952–55 on the effect of external factors in initiating the pupal diapause in *Heliothis armigera* (Hb.) (*Chloridea obsoleta*, auct.) [*cf. R.A.E.*, A **48** 205].

In Azerbaijan, observations in cotton fields in 1953–54 showed that diapause pupae appeared in mid-September, were produced in the greatest proportion (83 per cent. in 1953 and about 90 per cent. in 1954) in early October, and became relatively less numerous thereafter. The duration of the pupal stage for pupae kept at 23–25°C. [73·4–77°F.] ranged from 10–20 to over 200 days; 10–20 days is the normal duration, and periods of more than 30 days are due to diapause. Some of the diapause pupae completed the pupal stage in 50–80 days, but a considerable proportion required much longer (100–212 days in 1954). Those requiring the longest were pupae formed in the second half of September and early October; pupae formed thereafter completed their development in shorter periods (30–100 days), and there was even an increase in the proportion of non-diapause pupae at the end of October.

Larvae collected in the Ukraine in August–October were kept in the laboratory at 20–23°C. [68–73·4°F.] or transferred (in 1955) to soil cages for pupation. In the laboratory, diapause pupae appeared in the first half of September (or even earlier in some cases). The proportion increased sharply later in the month and reached 100 per cent. during the second week of October, after which it decreased somewhat. For diapause pupae, the pupal stage lasted up to 101–150 days, and the proportion of long-cycle pupae was greatest among those formed in mid-September. Pupae in the soil cages were removed at the end of November and kept at 15–18°C. [59–64·4°F.]. Some that had the characters of diapause resumed development after a few days, but over half remained in diapause, and the pupal stage of these lasted up to 102–150 days.

The laboratory experiments carried out in Azerbaijan in 1952–54 and in Leningrad in 1955 showed the effect of photoperiod [*cf. loc. cit.*] in initiating the diapause. In a test at 25–26°C. [77–78·8°F.] in June 1952, in which larvae were exposed to natural daylight conditions (about 15 hours daylight) and daily photoperiods of 8, 10 and 12 hours during the development period, the percentages of diapause pupae were 0, 45·9, 40 and 22·6, respectively. In more detailed tests in May 1954 and May–June 1955, eggs or young larvae were kept at four temperatures ranging from about 30 to 18°C. [86–64·4°F.] under conditions of natural daylight (15 hours or more per day) or a daily photoperiod of 8–10 hours; tomato leaves were provided as food. No diapause pupae were found under the natural conditions and some at all temperatures under the short photoperiod, the percentage being much the greatest at about 23°C. In 1953, larvae were fed on cotton, tomato and lucerne under conditions of natural daylight or a short photoperiod (10 hours) in summer and autumn. There was no diapause under natural daylight conditions, and much less under the short photoperiod at high temperatures (26–28°C. [78·8–82·4°F.]) in summer than at 23°C. in autumn. The larvae that fed on lucerne gave rise to far fewer diapause pupae than did those that fed on tomato and cotton, which gave about the same results.

TER-MINASYAN (M. E.). **A new pest of vines in the Maritime Region (Coleoptera, Attelabidae).** [*In Russian.*]—*Rev. Ent. URSS* **38** pt. 2 pp. 361–362, 2 figs. Moscow, 1959.

BOUS (A. K.). **The vine weevil** *Coenorrhinus vitis* **T.-M. (Coleoptera, Attelabidae) in the Maritime Region.** [*In Russian.*]—*T.c.* pp. 363–364, 3 refs.

In the first of these papers, the author describes the adults of both sexes of *Rhynchites* (*Coenorhinus*) *vitis*, sp.n., which causes considerable damage to vines in the Maritime region of the Soviet Union.

It is reported in the second paper that *R. vitis* is most injurious in damp places. The adult weevils appeared during flowering, from 12th June to 12th July; pairing occurred on the soil or on flowers, and the eggs were deposited in the young fruits, singly, near or in the seeds, so that there were often several eggs in one grape. Grapes infested early in their development dried up, and the eggs died, but those infested later permitted development of the larvae. These fed in the seeds and became full-grown between 20th August and 20th September, dropped to the ground and entered the soil to depths of 4·8–5·8 in., where they overwintered in cells. Pupation took place between 10th June and 30th July of the following year, and the adults emerged shortly afterwards. Control measures are suggested, and other weevils that injure vines in the Soviet Union are noted.

ÉDEL'MAN (N. M.) & MALȲSHEVA (M. S.). **On the bionomics of the beetle** *Scolytus intricatus* **Ratz. (Coleoptera, Ipidae) in the oak-groves of the Savala forests in the Voronezh region.** [*In Russian.*]—*Rev. Ent. URSS* **38** pt. 2 pp. 368–381, 2 graphs, 40 refs. Moscow, 1959. (With a summary in English.)

The following is based partly on the authors' summary. Widespread mortality of oak trees that began in 1953 in the Savala forests, in the Voronezh region, was found to be caused by *Ceratocystis* (*Ophiostoma*) sp. Since fungi of this genus are transmitted by insects, a search for the vector was made. Nine wood- and bark-borers were reared from infected trees, but only *Scolytus intricatus* (Ratz.) appeared likely to be involved in transmission. The fungus was subsequently isolated from it and from the wounds made by its feeding on twigs of healthy trees. This Scolytid has only one generation a year. On emergence in May–June, the sexually immature adults feed for 10–12 days on young twigs on healthy and diseased trees, and it is during this period that the fungus is transmitted. The larvae develop in weakened trees and play no part in transmission. The range of flight of the adults does not exceed 110 yd., and activity is greater at higher temperatures. Most flight occurs at sunset. The control measures suggested comprise felling and destroying newly infested trees, spraying the crowns with DDT or BHC and the use of trap-logs.

RȲVKIN (B. V.). **On the bionomics and economic importance of** *Trichogramma embryophagum* **(Htg.) (Hymenoptera, Trichogrammatidae).** [*In Russian.*]—*Rev. Ent. URSS* **38** pt. 2 pp. 382–393, 35 refs. Moscow, 1959. (With a summary in English.)

The author reviews the systematic position of *Trichogramma embryophagum* (Htg.), gives characters differentiating it from *T. evanescens* Westw., reviews its numerous hosts and gives information on its bionomics, based on the literature and on field and laboratory observations in the European part of the Soviet Union. It is a forest species [*cf. R.A.E.*, A **46** 399] and gives important control of the eggs of numerous forest Lepidoptera and a few sawflies. When it develops in large eggs, such as those of *Dendrolimus pini* (L.), its fecundity and the proportion of female progeny produced are greater than those of any other species of the genus. In laboratory investigations in which it was reared in the eggs of *D. pini*, the number of offspring per female averaged 146 and ranged up to some 200, but reached 340 in individual cases. The percentage of females averaged 96·3, and the number of progeny per host egg averaged 33, but the latter figure varied inversely with the number of host eggs parasitised. Observations in the winter of 1955–56 in a forest area infested by *D. pini* showed that the parasite overwintered in the larval stage in the eggs of *Lymantria monacha* (L.), the adults emerging in the spring of 1956. Winter mortality was often high. Other species that overwinter in the eggs of their hosts are reviewed. In addition to the winter diapause, there is also a summer or autumn one in certain hosts. The duration of development ranged from 9 to 20 days in summer and was somewhat longer in spring and autumn, so that there may be 5–7 generations during the vegetative period, depending on the weather and the availability of a succession of host eggs; the succession observed in one forest district is shown in a table. Notes on laboratory rearing are given, and an experiment in which *T. embryophagum* was released against *D. pini* in July–August 1955 is described. In September, 36·2 per cent. of the eggs of the host were parasitised by *T. embryophagum* as compared with the usual level of 2 per cent., and 23·2 per cent. (about the normal proportion) by *Telenomus*. Infestation of the trees by larvae was nevertheless fairly high. In the following spring and summer, the larvae and pupae of *D. pini* were attacked by Tachinids and Sarcophagids, and the number of adults that emerged was small. The few resulting eggs were parasitised by *Trichogramma* and *Telenomus*.

MASLENNIKOVA (V. A.). **Relation of seasonal cycles in geographical populations of** *Apanteles glomeratus* **L. and its host** *Pieris brassicae* **L.** [*In Russian.*]—*Rev. Ent. URSS* **38** pt. 3 pp. 517–522, 2 graphs, 8 refs. Moscow, 1959. (With a summary in English.)

In further investigations in the Soviet Union on the responses of *Apanteles glomeratus* (L.) and one of its hosts, *Pieris brassicae* (L.), to changes in temperature and photoperiod [*cf. R.A.E.*, A **49** 136], strains of the parasite from Leningrad and Sukhum were each reared on strains of the host from the same two places, on cabbage in jars. Most of the experiments were carried out at 18°C. [64·4°F.], and at that temperature both hosts and parasites in all four combinations reacted similarly to photoperiod, developing without diapause under long-day conditions (16 hours light) and entering diapause under a short photoperiod. For unparasitised hosts, the critical photoperiod was about 14–15 hours for the Leningrad strain and about 12 hours for the Sukhum one. For *Apanteles*, it was about 15 hours for the Leningrad strain and about 9 hours for the Sukhum strain in hosts from either place, but not more than 45–70 per cent. of the Sukhum insects entered diapause. The reaction of the parasite was sometimes opposed to that of the host. Thus, under a 14-hour photoperiod, *Pieris* from Sukhum developed without diapause, whereas all the larvae of *Apanteles* from Leningrad entered diapause. Diapause was complete in *Pieris* from Leningrad under a 12–14 hour photoperiod, whereas *Apanteles* from Sukhum parasitising it developed without diapause. Similar diapause behaviour in host and parasite is therefore thought to be due, not to an effect of the host on the parasite [*cf.* **30** 64], but to similar though independent reactions to environment.

Further experiments were carried out under constant illumination and a photoperiod of 9 hours at temperatures of 18, 23 and 25°C. [64·4, 73·6 and 77°F.]. Under the short photoperiod, all examples of *Pieris* from Leningrad entered diapause at all temperatures, whereas those of *Pieris* from Sukhum did so only at the lowest, the percentage decreasing as the temperature was increased. The percentage also decreased as temperature rose for both strains of *Apanteles* developing in *Pieris* from Sukhum, but they reacted differently, the percentage falling from 100 at 18°C. to not more than 10 at 23 and 25°C. in the Leningrad strain and from about 50 at 18°C. to 0 at 23°C. in the Sukhum one. There was no diapause in either hosts or parasites under continuous illumination.

The implications of the findings for the introduction of parasites from one region to another are briefly discussed.

Shumakov (E. M.), Édel'man (N. M.) & Borisova (A. E.). **An experiment in rearing some phytophagous insects on artificial media.** [*In Russian.*] —*Dokl. Akad. Nauk SSSR* **130** no. 1 pp. 237–240, 8 refs. Moscow, 1960.

Details are given of five synthetic diets on which larvae of *Loxostege sticticalis* (L.), *Heliothis armigera* (Hb.) (*Chloridea obsoleta*, auct.) and *Pexicopia* (*Gelechia*) *malvella* (Hb.) were reared in the laboratory in the Soviet Union, together with a discussion of the results obtained.

Rafes (P. M.). **Types of galleries of Siricids and regularities in the behaviour of the larva determining the form of its gallery in wood.** [*In Russian.*] —*Dokl. Akad. Nauk SSSR* **132** no. 2 pp. 478–480, 1 fig., 8 refs. Moscow, 1960.

As little is known of the galleries made by the larvae of Siricids in wood, observations were made in the Soviet Union on those of *Sirex* (*Paururus*) *noctilio* F. in pine. The four types found are described, and a table is given showing the activities of the larvae in each of their four instars, in comparison with those recorded for *S.* (*P.*) *juvencus* L. [*cf. R.A.E.*, A **21** 179].

Tereznikova (É. M.). **Scale insects (Homoptera, Coccoidea)—injurious to fruit crops of the Transcarpathian region.** [*In Ukrainian.*]—*Dopov. Akad. Nauk ukr. RSR* 1960 no. 1 pp. 110–114, 9 refs. Kiev, 1960. **On the bionomics of scale insects (Insecta Homoptera, Coccoidea) in the conditions of the Transcarpathian region.** [*In Ukrainian.*]—*T.c.* no. 4 pp. 536–539. (With summaries in Russian & English.)

In the first of these papers, 12 species of Coccids are recorded from trees in the Transcarpathian region of the Soviet Union, with notes on their food-plants and wider distribution. Those found on fruit trees comprised *Quadraspidiotus* (*Diaspidiotus*) *perniciosus* (Comst.), *Q.* (*D.*) *spurcatus* (Sign.), *Epidiaspis leperii* (Sign.), *Lepidosaphes ulmi* (L.), *Eulecanium* (*Parthenolecanium*) *corni* (Bch.) and *E.* (*Sphaerolecanium*) *prunastri* (Boy.).

The second paper contains notes on the development of 27 species of Coccids in the area, including the first one and the last two of those mentioned above, based on observations in the summers of 1956–58.

Wright (C. G.). **Biology of the southern** *Lyctus* **beetle,** *Lyctus planicollis.* —*Ann. ent. Soc. Amer.* **53** no. 3 pp. 285–292, 4 figs., 8 refs. College Park, Md., 1960.

The following is based on the author's abstract. New techniques are described that permitted more detailed studies than were hitherto possible of the bionomics of *Lyctus planicollis* Lec. [*cf. R.A.E.*, A **45** 194]. Among these was one using wood shavings as an oviposition site from which large numbers of eggs could easily be collected. In several tests, egg-production averaged 51 per female; the eggs were deposited over periods ranging up to 16–17 days, and over 90 per cent. were viable. The egg stage lasted about eight days. Technical difficulties prevented determination of the duration of larval life. A prepupal stage, previously unreported, preceded the pupal stage, which required about eight days. An estimated period of 14 to 18 days elapsed after eclosion before adults constructed exits from the wood, and usually several more days passed before they actually emerged. The total duration of adult life averaged 33 days for males and 35 days for females. Of 3,408 beetles reared in a stock culture, 1,723 were males and 1,685 females.

Bartlett (B. R.). **Biological races of the black scale,** *Saissetia oleae*, **and their specific parasites.**—*Ann. ent. Soc. Amer.* **53** no. 3 pp. 383–385. College Park, Md., 1960.

Saissetia oleae (Bern.), imported into California in May 1954 on *Nerium oleander* from a district in Mexico in which *Citrus* was free from the scale, was found to be parasitised by several Hymenoptera, including *Aphycus* (*Metaphycus*) *luteolus* Timb., which attacks *S. oleae* in California, but is restricted to examples 0·6–1·6 mm. in length, and is a common parasite of *Coccus hesperidum* L. there. In 1955, *S. oleae* was found in the Imperial Valley infesting commercial fig, which is attacked by this scale in Texas and Arizona but was not previously known among its food-plants in California. In the laboratory, Coccids of this strain readily attacked *N. oleander* and seemed particularly adapted to citron melon (*Colocynthis* (*Citrullus*) sp.), which is unsuitable as a food-plant for the usual Californian *S. oleae*. The strain of *A. luteolus* from Mexico readily parasitised this strain of *S. oleae*, but not the usual Californian one, to which it could not be adapted in laboratory tests. This indicates the existence of distinct biological races, which has not previously been reported for *S. oleae*.

Schlinger (E. I.) & Hall (J. C.). **Biological notes on Pacific Coast Aphid parasites, and lists of California parasites (Aphidiinae) and their aphid hosts (Hymenoptera: Braconidae).**—*Ann. ent. Soc. Amer.* **53** no. 3 pp. 404–415, 25 refs. College Park, Md., 1960.

Notes are given on the distribution, rearing, parasites, diapause and other bionomics of 18 species of Aphidiines that occur in California and five from British Columbia, together with information on their aphid hosts, followed by lists of the 26 species now known to occur in California, with their hosts, and of the latter, showing the Aphidiines that attack them. New records are indicated.

Kreasky (J. B.). **Extended diapause in eggs of high-altitude species of grasshoppers, and a note on food-plant preferences of** *Melanoplus bruneri*.—*Ann. ent. Soc. Amer.* **53** no. 3 pp. 436–438, 4 refs. College Park, Md., 1960.

The following is virtually the author's abstract. To investigate the possibility that their eggs require more than a year for development on high-altitude rangeland in the northern Rocky Mountain region of the United States, adults of *Melanoplus bruneri* Scud., *M. borealis* (Fieb.), *M. alpinus* (Scud.) and *Chorthippus longicornis* (Latr.) were caged on their native habitat. After two years, the eggs found in the soil under the cages were brought into the laboratory. A short period of incubation caused all the eggs of *M. borealis* to hatch, but more than half those of the other species failed to do so. An additional cold period was necessary to terminate the diapause in the remaining eggs. Nymphs and adults of *M. bruneri* fed heavily on lupine (*Lupinus sericeus*) and timothy (*Phleum pratense*), and damage to timothy became especially noticeable as lupine became depleted. Many plant species in the habitat were ignored as food sources.

Jacobson (L. A.). **Influence of photoperiod on oviposition by the army cutworm,** *Chorizagrotis auxiliaris* (**Lepidoptera: Noctuidae**), **in an insectary.**—*Ann. ent. Soc. Amer.* **53** no. 4 pp. 474–475, 9 refs. College Park, Md., 1960.

The following is substantially the author's abstract. In Alberta, adults of *Chorizagrotis auxiliaris* (Grote) emerge in June, but eggs are not laid until late August or September, the intervening preoviposition period being spent in diapause. In insectary tests, the mean durations of the preoviposition period were 33, 46·5 and 27·3 days at photoperiods of 18, 15 and 12 hours, respectively.

Heron (R. J.). **The relative effects of cocoon submergence on the mortality of the larch sawfly,** *Pristiphora erichsonii* (**Hymenoptera: Tenthredinidae**), **and its parasite** *Bessa harveyi* (**Diptera: Tachinidae**).—*Ann. ent. Soc. Amer.* **53** no. 4 pp. 476–481, 1 graph, 10 refs. College Park, Md., 1960.

The following is substantially the author's abstract. Laboratory experiments on the effects of submerging cocoons of *Pristiphora erichsonii* (Htg.) immediately after the overwintering period confirmed earlier reports of the resistance of the eonymphs to flooding [*cf. R.A.E.*, **45** 110]. The Ichneumonid parasite, *Mesoleius aulicus* (Grav.) (*tenthredinis* Morl.), appeared able to survive flooding as well as the host, but *Ptychomyia selecta* (Mg.) (*Bessa harveyi* (Tns.)) was susceptible to flooding of even short duration, apparently owing to the early inception of larval development. Larvae of *Pristiphora* parasitised by this Tachinid had a far higher rate of oxygen consumption than unparasitised ones. Its susceptibility to submersion seems to be a factor limiting the effectiveness of *Ptychomyia selecta* and may account for its sporadic distribution.

Yamamoto (R. T.) & Fraenkel (G. S.). **Assay of the principal gustatory stimulant for the tobacco hornworm,** *Protoparce sexta*, **from solanaceous plants.**—*Ann. ent. Soc. Amer.* **53** no. 4 pp. 499–503, 3 figs., 11 refs. College Park, Md., 1960. **The specificity of the tobacco hornworm,** *Protoparce sexta*, **to solanaceous plants.**—*T.c.* pp. 503–507, 13 refs.

These two papers are based on investigations carried out in the United States, and the following is substantially the authors' summary of the second of them. Oviposition and feeding by *Protoparce sexta* (Joh.) are almost entirely restricted to solanaceous plants. Oviposition appears to be initiated by olfactory stimuli widely distributed in plants of this family and is largely suppressed in the absence of such plants or after excision of the antennae. In both field and laboratory, the females preferred tomato to other solanaceous plants. Larval feeding appears to be governed by gustatory stimuli common to plants of this family, but feeding and growth on some, such as *Nicandra* and *Petunia*, are limited by the presence of repellents or toxins. Some feeding occurred on certain non-solanaceous plants after various periods of starvation.

The first paper contains details of the isolation of a gustatory stimulant from tomato and other solanaceous plants and of investigations on it, and the following is taken from the authors' abstract. Preliminary characterisation indicated that the material is a glycosidic substance, but its chemical identity has not yet been determined. In its presence, the larvae attacked filter paper, lettuce leaves or artificial agar diets, provided that certain nutrients, particularly sugars, were also present. The material also stimulated feeding by *Leptinotarsa decemlineata* (Say), which feeds on plants of the same family.

O'Neill (K.). **Identification of the newly introduced Phlaeothripid** *Haplothrips ? clarisetis* **Priesner (Thysanoptera).**—*Ann. ent. Soc. Amer.* **53** no. 4 pp. 507–510, 8 figs., 4 refs. College Park, Md., 1960.

An exotic species of *Haplothrips* tentatively identified as *H. clarisetis* Priesn. has been present in California since 1956 and in New Mexico since 1958. It mostly attacks Russian thistle (*Salsola kali*) in the former and injures lettuce in the latter [*cf. R.A.E.*, A **48** 481]. Characters distinguishing it from other thrips in the newly invaded areas are described.

Coppel (H. C.), Casida (J. E.) & Dauterman (W. C.). **Evidence for a potent sex attractant in the introduced pine sawfly,** *Diprion similis* **(Hymenoptera: Diprionidae).**—*Ann. ent. Soc. Amer.* **53** no. 4 pp. 510–512, 1 fig., 3 refs. College Park, Md., 1960.

In field investigations in Wisconsin, virgin females of *Diprion similis* (Htg.), which attacks eastern white pine (*Pinus strobus*), were found capable of attracting very large numbers of males, one caged female attracting over 11,000. The attractant was apparently produced by the abdominal glands, and investigations on its chemical composition were begun.

Prescott (H. W.). **Suppression of grasshoppers by Nemestrinid parasites (Diptera).**—*Ann. ent. Soc. Amer.* **53** no. 4 pp. 513–521, 6 figs., 13 refs. College Park, Md., 1960.

The following is taken from the author's abstract. This paper is concerned chiefly with the effect of parasitism by the Nemestrinid, *Neorhynchocephalus sackenii* (Will.), on a population of *Melanoplus bilituratus* (Wlk.) in eastern Oregon in 1955–56, when 70 per cent. parasitism of the grasshopper occurred during an outbreak covering 200,000 acres. Decline of the host population resulted from shortened life-span and reduced egg-production by parasitised individuals. In cage tests, parasitised examples of *M. bilituratus*, *M. bivittatus* (Say) and *M. femur-rubrum* (Deg.) lived not more than half as long as unparasitised ones, and their egg-production was reduced by 93, 49 and 95 per cent., respectively. Though *M. bivittatus* was heavily parasitised in the field, it is apparently not a true host of *N. sackenii*, as none of the larvae reached maturity in 180 examples of the grasshopper kept under observation. Parasitism of *M. femur-rubrum* was accomplished in the laboratory by placing a parasite larva on the abdomen of the host and allowing it to penetrate.

SWENSON (K. G.). **Aphid-virus relationships in the transmission of bean yellow mosaic virus by** *Myzus persicae*.—*Ann. ent. Soc. Amer.* **53** no. 4 pp. 521–524, 7 refs. College Park, Md., 1960.

The following is based on the author's abstract of this account of investigations on the effect of the period of acquisition feeding and preliminary starvation on the transmission of the virus of yellow bean mosaic [*cf. R.A.E.*, A **43** 427] from broad beans (*Vicia faba*) to garden beans (*Phaseolus vulgaris*) by *Myzus persicae* (Sulz.). No significant differences in transmission rate were found when the acquisition feeds were in the 11- to 45-second range, but there was a marked reduction when acquisition feeding was extended to 51–60 seconds. The transmission rate was higher if aphids were starved for five minutes or more before they fed on the diseased plants. The maximum effects of preliminary starvation were obtained in 10–15 minutes, and no further changes in transmission rate were observed with starvation periods up to four hours. The differences in transmission rates between starved and unstarved aphids could not be explained by differences in acquisition feeds. Failure of some aphids to transmit the virus, while others that had the same period of preliminary starvation did, was not due to differences in the duration of acquisition feeds. Nor could large inter-replicate or inter-experiment variations in transmission be explained by variations in aphid behaviour.

MUMA (M. H.). **Hymenopterous parasites of Chrysopidae on Florida** *Citrus*. —*Florida Ent.* **42** no. 4 pp. 149–153, 6 refs. Gainesville, Fla., 1959.

Chrysopids are common predators in many *Citrus* groves in Florida [*cf. R.A.E.*, A **49** 351]. In 1952–56, cocoons of *Chrysopa* spp. were collected and parasites reared from them. In all, 11 species were obtained, including several hyperparasites. The three commonest showed some degree of host specificity, but no relation could be shown between parasitism and Chrysopid numbers. However, Chrysopids are commonest in the groves in spring and summer, and the population falls sharply in autumn and winter. The existence of an unknown control factor is suspected.

HETRICK (L. A.). **Ecology of the pine sawfly,** *Neodiprion excitans* (**Rohwer**) (**Hymenoptera, Diprionidae**).—*Florida Ent.* **42** no. 4 pp. 159–162, 5 refs. Gainesville, Fla., 1959.

Neodiprion excitans Rohw. caused considerable defoliation of loblolly pine (*Pinus taeda*) in north-central Florida in the autumn of 1957, and further damage occurred in 1958. Observations on the sawfly were made, and the following is taken from the author's summary of the results.

N. excitans is mainly a defoliator of *P. taeda*. Oviposition occurs on established pine needles, with one egg per needle just above the needle sheath. In the spring of 1959, eggs hatched in approximately 10 days. The four larval feeding instars require approximately 10 days each. Most prepupae spin cocoons in the litter and soil, but some are found on pine needles, on bark or on low-growing vegetation. There are several generations a year, but the number has not been determined. Important factors in natural control are insect parasites, predators, polyhedral disease and excessive rainfall.

HARRIS jr. (E. D.). **Budworm control studies on sweet corn in the Everglades.**—*Florida Ent.* **42** no. 4 pp. 163–167, 3 graphs, 9 refs. Gainesville, Fla., 1959.

Sprays of 1 U.S. quart 25 per cent. DDT emulsion concentrate or 2·5 lb. 40 per cent. wettable toxaphene per 100 U.S. gal. are recommended for the control of budworms on sweet maize in Florida, but have recently given poor results. Tests were therefore carried out to compare other insecticides with them, and the results, which are given and discussed, indicated that parathion, alone or in combination with other materials, gave significantly better control than any other treatment except a mixture of heptachlor with phosphamidon. The budworms present included *Spodoptera (Laphygma) frugiperda* (J. E. Smith), which was the commonest, *Heliothis zea* (Boddie) and *Prodenia eridania* (Cram.).

ATTIAH (H. H.). **On the discovery of two economic species of Eriophyid mites on mango and** *Citrus* **trees in Florida.**—*Florida Ent.* **42** no. 4 p. 189, 4 refs. Gainesville, Fla., 1959.

Aceria mangiferae Sayed and *A. sheldoni* (Ewing) were observed on mango and *Citrus*, respectively, in Florida in 1959.

SOKAL (R. R.). **A morphometric analysis of strains of** *Drosophila melanogaster* **differing in DDT-resistance.**—*J. Kans. ent. Soc.* **32** no. 4 pp. 155–172, 16 refs. Manhattan, Kans., 1959.

A study of 14 morphological characters of adults of *Drosophila melanogaster* Mg. of six strains that were resistant to DDT in the larval medium and eight that were not showed that differences existed between resistant and non-resistant flies but that they were not consistent and not correlated with resistance.

ADKISSON (P. L.). **The effect of various humidity levels on hatchability of pink bollworm eggs.**—*J. Kans. ent. Soc.* **32** no. 4 pp. 189–190, 4 refs. Manhattan, Kans., 1959.

Pectinophora gossypiella (Saund.) has spread across a large part of the belt in which cotton is grown in the United States. In 1958, it was found in Arkansas, near the Mississippi River, in areas not previously known to be infested, and infestations were discovered in Arizona in an area from which the insect had once been eradicated. Since the ecological implications of spread into areas having such diverse climatic conditions are of interest, the effect of relative humidity on hatching was investigated. Eggs collected daily from cotton leaves in the laboratory were kept at four relative humidities. The percentages that had hatched after a week averaged 67·5, 58·3, 90·4 and 88 at relative humidities of 0, 45, 75 and 100 per cent., respectively, and it is concluded that humidity is not a factor retarding infestation in the field.

Evans (W. G.). **The biology and control of the alfalfa weevil in Virginia.**— *Bull. Va agric. Exp. Sta.* no. 502, 28 pp., 7 figs., 8 refs. Blacksburg, Va., 1959.

Hypera variabilis (Hbst.) (*postica* (Gylh.)) is the most important insect pest of lucerne in Virginia. All stages of the weevil and the damage caused are described, its food-plants are reviewed, and the results are given of investigations on its bionomics and control, carried out mainly in 1957–58. These showed that it has one generation a year, with a partial second when the autumn is favourable, and that many eggs and some adults overwinter in the stubble. Satisfactory or excellent control was given by treatment in early spring with heptachlor in granules or mixed with fertiliser [*cf. R.A.E.*, A **46** 185].

Rosberg (D. W.) & King (D. R.). **Pecan diseases and insects and their control.**— *M*[*isc.*] *P*[*ubl.*] *Tex. agric. Exp. Sta.* no. 313, 19 pp., 23 figs., 11 refs. College Station, Tex., 1958.

Keys are given to the diseases and insects that attack pecan in Texas, followed by spray schedules for their control and, for the insects, information on their bionomics and methods of control; notes on spraying equipment are included. The most important of the insects is *Acrobasis caryae* Grote.

Ellertson (F. E.) & Ritcher (P. O.). **Biology of rain beetles, *Pleocoma* spp., associated with fruit trees in Wasco and Hood River Counties.**— *Tech. Bull. Ore. agric. Exp. Sta.* no. 44, 42 pp., 10 figs., 3½ pp. refs. Corvallis, Ore., 1959.

Larvae of the genus *Pleocoma* were found responsible for a decline of apple trees in the Hood River valley of Oregon in 1953, and investigations on these Lamellicorns were made in subsequent years [*cf. R.A.E.*, A **45** 282]. The following is based on the authors' summary of the results. *P. crinita* Linsley and *P. minor* Linsley were found to be associated with apple, pear and sweet cherry in Hood River County, and *P. oregonensis* Leach with sweet cherry in Wasco County. The larvae feed on fibrous roots, main roots and underground parts of trunks at depths of 3·5–60 in. and moult once a year, in summer. Those of the first two species pass through 9–13 instars, and the third apparently develops similarly. The females are wingless and lay up to 60 or more eggs each, in the soil, in May and June. The larvae hatch later in the summer, and, after feeding is completed, pupate, also in late summer, giving rise soon after to adults, which pair during rainy periods in autumn and winter and do not feed. Females are rarely found on the surface. The adults are devoured by skunks, but no insect parasites or predators are known. A key to both sexes of the three species is included.

CLIFFORD (P. A.), BASSEN (J. L.) & MILLS (P. A.). **Chlorinated organic pesticide residues in fluid milk.**—*Publ. Hlth Rep.* **74** no. 12 pp. 1109–1114, 5 refs. Washington, D.C., 1959.

The following is taken from the authors' summary. In a survey in August–November 1958, 936 samples of raw milk from 48 dairies in 16 metropolitan areas in all parts of the United States were examined for the presence of chlorinated insecticides by a paper chromatographic method, and residues of 0·1 part per million or more, mainly of DDT, were found in 23 of them [*cf. R.A.E.*, A **47** 477]. Further examination of 168 of the samples by paper chromatography showed significant residues in five. The 168 samples were also analysed by bioassay with house-flies [*Musca domestica* L.], and toxic reactions were caused by 33 or 54 per cent. of the samples according to the technique used. Corresponding significant mortalities (death of more than 10 per cent. of 100 flies) were 15·5 and 39·3 per cent., respectively. The difference in results obtained by chromatography and bioassay is attributed to the reflection by bioassay of the sum of all residues toxic to the fly and the extreme sensitivity of house-flies to certain insecticides. Contamination of one sample of milk containing more than 0·1 p.p.m. toxic residue was found to be attributable to feeding on DDT-contaminated maize silage and of two others to careless spraying of barns with a concentrated solution of DDT.

GETZIN (L. W.). *Spicaria rileyi* **(Farlow) Charles, an entomogenous fungus of** *Trichoplusia ni* **(Hübner).**—*J. Insect Path.* **3** no. 1 pp. 2–10, 7 refs. New York, N.Y., 1961.

The following is virtually the author's summary. *Beauveria* (*Spicaria*) *rileyi*, an entomogenous fungus, caused an epizootic among populations of *Trichoplusia ni* (Hb.) on cruciferous crops in the Lower Rio Grande Valley of Texas in the autumn and winter of 1958. The organism was studied in the laboratory to determine its virulence and environmental requirements. The fungus was lethal to early-instar *Trichoplusia* larvae, but failed to kill the later instars. *B. rileyi* caused host mortality in 6–7 days when newly hatched larvae were sprayed with a spore suspension, whereas *B. bassiana* and *Metarrhizium* spp. caused mortality in 3–4 days. *B. rileyi* developed best at 25°C. [77°F.] but grew actively between 15 and 30°C. [59 and 86°F.]. A high relative humidity was required for host infection and subsequent sporulation by the fungus. The disease was induced among a population of *T. ni* in the field by artificial dissemination of spores as a spray during a period when natural infection was not evident. No secondary spread of the disease occurred, however, because a lack of moisture prevented the fungus from sporulating on the cadavers.

KRYWIENCZYK (J.) & BERGOLD (G. H.). **Serological studies of inclusion-body proteins by agar diffusion technique.**—*J. Insect Path.* **3** no. 1 pp. 15–28, 42 figs., 21 refs. New York, N.Y., 1961.

The following is virtually the authors' summary. Polyhedron inclusion-body proteins formed in virus-infected Lepidoptera appear to share at least two antigenic groupings, and to possess at least one specific antigenic grouping characteristic of the individual protein. The capsule protein from *Recurvaria milleri* Busck is serologically similar to the Lepidopterous polyhedron proteins. The capsule proteins did not cross-react to a significant degree; only those from phylogenetically very closely related hosts (*Choristoneura fumiferana* (Clem.) and *C. murinana* (Hb.)) proved to be serologically closely related. The two polyhedron proteins from Hymenopterous insects (*Neodiprion sertifer* (Geoffr.) and *Gilpinia* (*Diprion*) *hercyniae* (Htg.)) appeared to be very closely related, although the haemolymphs from the hosts did not cross-react in the agar diffusion test. Attempts to relate the serological relationship of polyhedron inclusion-body proteins to the phylogenetic classification of the hosts were unsuccessful. The haemolymphs and the inclusion-body proteins proved to be serologically unrelated.

SMIRNOFF (W. A.). **A virus disease of** *Neodiprion swainei* **Middleton.**—*J. Insect Path.* **3** no. 1 pp. 29–46, 6 figs., 1 ref. New York, N.Y., 1961.

A nuclear polyhedrosis virus was found affecting larvae of *Neodiprion swainei* (Middleton), a defoliator of jack pine (*Pinus banksiana*), in north-eastern Ontario in 1953 and the St. Maurice region of Quebec in 1956. It was successfully introduced into large natural populations of the sawfly in other parts of Quebec in 1957–59, and was studied concurrently in the field and laboratory. The following is virtually the author's summary of the results.

Young larvae of *N. swainei* infected with the nuclear polyhedrosis virus die more rapidly than older larvae, and the total mortality is greater. When infection occurs in the third or later instars, the disease process is progressively slower, and larger proportions survive to spine cocoons. Disease development is increased at higher temperatures in the laboratory and in parts of the forest exposed to full sunlight. Other things being equal, the concentration of the virus suspension affects the rate of disease development and the ultimate percentage of mortality. Effective virus concentrations range from about 500,000 to 3,000,000 polyhedra per ml. Higher concentrations do not hasten the disease process or increase mortality. Lower concentrations, down to 1,000 polyhedra per ml., cause death in successively smaller proportions of the infected larvae, in progressively longer periods. Spread of the disease by the larvae is neither rapid nor extensive, being limited to several hundred yards, the extent of possible larval migration. This is compensated for by transovarial transmission and movement by wind and predators [*cf. R.A.E.*, A **48** 189]. Experimental applications of virus suspensions during the egg stage and early larval stages resulted in good control of the treated populations, and local spread of the disease in late summer. The disease reappeared in the following year in the progeny of larvae that experienced a non-fatal infection. The virus is readily preserved within the polyhedra when present in dried larvae, or in dilute mixtures of dead larvae and water. Short-period storage of the polyhedra in benzene or fuel oil does not reduce pathogenicity of the virus.

JAQUES (R. P.). **The influence of physical stress on growth and nuclear polyhedrosis of** *Trichoplusia ni* (**Hübner**).—*J. Insect Path.* **3** no. 1 pp. 47–54, 16 refs. New York, N.Y., 1961.

The following is based on the author's summary. When larvae of *Trichoplusia ni* (Hb.) were reared on a shaker or vibrator, their growth was retarded slightly and the incidence of disease resulting from feeding on low dosages of polyhedra of the nuclear polyhedrosis virus to which they are subject [*cf. R.A.E.*, A **48** 510] was up to four times as great as among control larvae. The effect of physiological stress in host larvae exposed to this type of physical disturbance is discussed.

HAYNES (W. C.), ST. JULIAN jr. (G.), SHEKLETON (M. C.), HALL (H. H.) & TASHIRO (H.). **Preservation of infectious milky disease bacteria by lyophilization.**—*J. Insect Path.* **3** no. 1 pp. 55–61, 6 refs. New York, N.Y., 1961.

The following is based on the authors' summary. Pure cultures of *Bacillus popilliae* and *B. lentimorbus* can be preserved by lyophilisation and remain viable thereafter for at least 20 months, thus providing a method for assuring a source of cultures of known characteristics for laboratory and other purposes. The ability of cultures so preserved to initiate milky disease in susceptible hosts (larvae of *Popillia japonica* Newm. and *Amphimallon majalis* (Razoum.)) is not destroyed. There appeared to be some diminution in the virulence of *B. popilliae* as a result of the process.

MARTIGNONI (M. E.) & SCHMID (P.). **Studies on the resistance to virus infections in natural populations of Lepidoptera.**—*J. Insect Path.* **3** no. 1 pp. 62–74, 4 figs., 22 refs. New York, N.Y., 1961.

The following is based on the authors' summary. A study was carried out in California in 1958–59 of the susceptibility of two populations of *Phryganidia californica* Pack., which infests oak, to the nuclear polyhedrosis virus affecting this species and of two populations of *Pieris rapae* (L.), which attacks cruciferous crops, to a granulosis virus affecting it. The two populations of *Phryganidia*, a native species having a long association with the pathogen [*cf. R.A.E.*, A **3** 356], showed differences in susceptibility and degree of heterogeneity, while the two populations of *Pieris*, a species of recent introduction, gave identical responses. A certain degree of resistance was detected in the population of *Phryganidia* known to have a large amount of stability (a so-called umbral population), while an unstable population in phase of increasing density was found to be less resistant and more heterogeneous. It is suggested that variations in the degree of susceptibility and heterogeneity of fluctuating insect populations may account for the recurrence of virus epizootics at periodic intervals.

HOLT (W. R.). *Metarrhizium anisopliae* (**Metchnikoff**) **Sorokin infecting larvae of the black turpentine beetle.**—*J. Insect Path.* **3** no. 1 p. 93. New York, N.Y., 1961.

Full-grown larvae of *Dendroctonus terebrans* (Ol.), their bodies covered with a white, cottony fungus, were found dead in pupal chambers under the bark of a stump of loblolly pine (*Pinus taeda*) in southern Mississippi on 21st April 1960. The fungus was identified as *Metarrhizium anisopliae*.

FOX (C. J S.). **The incidence of green muscardine in the European wireworm,** *Agriotes obscurus* (**Linnaeus**), **in Nova Scotia.**—*J. Insect Path.* **3** no. 1 pp. 94–95. New York, N.Y., 1961.

A population of *Agriotes obscurus* (L.) near Dartmouth, Nova Scotia, is known to be attacked by *Metarrhizium anisopliae*. During studies in 1957–60, it was found that few larvae and adults that had overwintered were infested with the fungus and that the highest mortality occurred immediately before, during and after the pupal stage. In general, mortality was low.

York (G. T.). **Microsporidia in parasites of the European corn borer.**—*J. Insect Path.* **3** no. 1 pp. 101–102. New York, N.Y., 1961.

During the autumn of 1955, larvae of *Ostrinia* (*Pyrausta*) *nubilalis* (Hb.), a pest of maize, were collected in Connecticut for the purpose of rearing parasites for release in Alabama. During parasite emergence in the following spring, high mortality occurred in *Chelonus annulipes* Wesm., most of the larvae that left their hosts pupating but failing to transform to adults. Examination of pupae showed the presence of *Perezia pyraustae* [*cf. R.A.E.*, A **43** 243]. During examination of larvae of *O. nubilalis* from Iowa, a few dead larvae of *Lydella grisescens* R.-D. were observed in them on several occasions. These were also infected by Microsporidia. Similar infection was also observed in *Macrocentrus gifuensis* Ashm. in the laboratory, the only parasites to emerge from their hosts dying without pupating. *P. pyraustae* was probably the species responsible.

Simmonds (F. J.) & Rao (V. P.). **Record of** *Plutella maculipennis* **Curt. and some of its parasites in Kashmir, India.**—*Canad. Ent.* **92** no. 4 p. 278, 3 refs. Ottawa, 1960.

Plutella maculipennis (Curt.) was found for the first time in Kashmir, on cabbage at Srinagar, during a recent visit by the authors. A Tachinid, *Voria ruralis* (Fall.), and an Ichneumonid of the genus *Angitia* (*Horogenes*) were reared from the larvae, and one example of *Itoplectis* sp., probably a hyperparasite, also emerged. Parasites that attack *P. maculipennis* on crucifers in India are reviewed from the literature.

LeRoux (E. J.) & Perron (J. P.). **Descriptions of immature stages of** *Coenosia tigrina* **(F.) (Diptera: Anthomyiidae), with notes on hibernation of larvae and predation by adults.**—*Canad. Ent.* **92** no. 4 pp. 284–296, 22 figs., 15 refs. Ottawa, 1960.

Coenosia tigrina (F.), the immature stages of which are described, was found in all stages of development among field populations of *Hylemyia antiqua* (Mg.) on onion in Quebec, where it is an important predator of this Anthomyiid. Studies on its morphology and life-cycle indicated that the larvae are already in the third instar on hatching, but no evidence of suppressed first and second instars was found when eggs at different stages of development were dissected. Overwintering larvae were found, for the first time, in compost soil and barn manure and apparently pupate in early spring; some pupae probably overwinter. The adults emerge at the same time as those of *H. antiqua*, and effectively reduced populations of the latter in field cages [*cf. R.A.E.*, A **46** 130].

Balch (R. E.). **The approach to biological control in forest entomology.**—*Canad. Ent.* **92** no. 4 pp. 297–310, 37 refs. Ottawa, 1960.

This discussion of biological control in forest entomology is concerned with the introduction of parasites, predators and micro-organisms against introduced insect pests. The method is particularly suited to forest conditions, where the environment is relatively complex and stable and the slow development of the crop necessitates the use of inexpensive measures. The general procedure adopted in Canada when an introduction is to be made is outlined, and the assumptions on which it is based are examined. These are that natural control systems tend to evolve towards increasing complexity, that natural enemies and diseases often have an important regulatory function and in a variable environment the more there are present the greater the probability of continuous control, and that competition between enemy species will seldom weaken the control complex. These assumptions appear justified, but need testing. The value of a complex of natural enemies is illustrated by reference to the biological control of *Gilpinia* (*Diprion*) *hercyniae* (Htg.) on spruce [*cf. R.A.E.*, A **46** 485] and possible limitations of the method by reference to the introductions of insect predators against *Chermes* (*Adelges*) *piceae* Ratz. on balsam fir (*Abies balsamea*) [*cf.* **48** 529, etc.], which is reduced to some extent by *Leucopis* (*Neoleucopis*) *obscura* Hal. [*cf.* **47** 120] and *Laricobius erichsonii* Rosenh. [*cf.* **48** 68], but, for control of which, species with high searching ability, capable of attacking it at low densities, are required. In assessing results, there appears to be, for forest insects, no fully satisfactory substitute for life-table studies of natural populations [*cf.* **44** 159], though valuable evidence is given by measurements of populations and mortality over several generations. A true control factor can be identified by the relation of the resulting mortality to population trend, but not by the amount of mortality alone. Biological control is concerned with the regulation, not the destruction, of populations, and it is inappropriate to consider ‘ control ’ and ‘ kill ’ as synonymous.

Burdick (D. J.) & Powell (J. A.). **Studies on the early stages of two California moths which feed in the staminate cones of digger pine (Lepidoptera: Gelechiidae).**—*Canad. Ent.* **92** no. 4 pp. 310–320, 10 figs., 18 refs. Ottawa, 1960.

Powell (J. A.). **A new species of the genus** *Chionodes* **in California (Lepidoptera, Gelechiidae).**—*Ent. News* **70** no. 5 pp. 127–130, 3 figs., 2 refs. Lancaster, Pa., 1959.

In the first paper, the authors state that, during work on the bionomics of *Xyela minor* Nort. in the staminate cones of digger pine (*Pinus sabiniana*) in California, two Gelechiids were found associated with it. These were *Exoteleia burkei* Keifer [*cf. R.A.E.*, A **20** 220] and one described in the second paper from adults of both sexes as *Chionodes sabinianae*, sp. n., both of which feed in the immature cones, causing them to become stunted or distorted. Field-collected larvae of *E. burkei* gave rise to adults from 10th May to 17th June. Third-instar and some second-instar larvae were collected in late February, fourth-instar larvae in early April and fifth-instar larvae in mid-April and early May. In February 1959, larvae in the second, third and fourth instars were found in conspicuous needle-mines. The mined needles turn brown from the feeding site to the tip, though the larvae do not feed in the tip. In March or early April, shortly before the staminate cones begin to elongate and while they are still almost enclosed by the bracts, the fourth-instar larva leaves its mine and constructs a silken tunnel between three or four cones, enters one at the base and mines up its axis, thereby killing it. It moves to a second cone on reaching the top of the first and sometimes attacks a third before pupating. In the laboratory, pupation usually occurred at the bottom of the container and occasionally within the silken tunnel. *C. sabinianae* probably feeds only on the cones, since larvae in at least three instars were found in them. The cones are webbed together along the long axis of the central stem and entered from the side. The younger larvae feed on the pollen sacs and the scales on which they are situated in cones emerging through the bracts; the unattacked part of the cone develops normally. Larvae in the last instar feed on the more terminal cones that are still enclosed. They attack several cones each and consume large pieces from the side or even the whole cone. Limited laboratory observations indicated that pupation takes place within the silken tunnel. Adults emerged from field-collected material in early May. The last-instar larvae of both species are described.

LEIUS (K.). **Attractiveness of different foods and flowers to the adults of some Hymenopterous parasites.**—*Canad. Ent.* **92** no. 5 pp. 369–376, 1 graph, 18 refs. Ottawa, 1960.

The following is based largely on the author's summary. Studies were made in the laboratory in Canada on the food preferences of the adults of three Hymenopterous parasites of *Rhyacionia buoliana* (Schiff.), *Itoplectis conquisitor* (Say), *Orgilus obscurator* (Nees) and *Ephialtes* (*Scambus*) *buolianae* (Htg.), which was introduced in 1956 and is not yet known to be established. The foods tested comprised, in all, flowers of eight species of wild plants representing five families, sucrose solution alone or containing pollen grains of Scots pine [*Pinus sylvestris*] in suspension, diluted honey, soaked raisins, larvae or pupae of *Galleria mellonella* (L.) and honeydew exuded by *Myzocallis alhambra* Davidson. Females of *I. conquisitor* and *E. buolianae* fed on the body fluids of *G. mellonella*, but those of *O. obscurator* and the males of all three species did not. Both sexes of *O. obscurator* were attracted to flowers of umbelliferous plants, but not to others, and preferred wild parsnip (*Pastinaca sativa*). The other two species were most attracted by umbelliferous flowers, but visited flowers of other families as well. The results indicate that information on adult feeding habits is essential when parasites are introduced for biological control purposes. If a favourite food is absent from the release area, the parasites have less chance of becoming established.

JUILLET (J. A.). **Immature stages, life histories, and behaviour of two Hymenopterous parasites of the European pine shoot moth,** *Rhyacionia buoliana* **(Schiff.) (Lepidoptera: Olethreutidae).**—*Canad. Ent.* **92** no. 5 pp. 342–346, 12 figs., 6 refs. Ottawa, 1960.

The following is based largely on the author's summary of this account of investigations on the bionomics of *Orgilus obscurator* (Nees) and *Cremastus* (*Temelucha*) *interruptor* Grav., internal parasites that were introduced into southern Ontario from Europe and released near Elmira for the control of *Rhyacionia buoliana* (Schiff.) on pine in 1955–59, although already present in the Province [*cf. R.A.E.*, A **48** 521]. The immature stages of both parasites are described. Their life-cycles are similar. There are five larval instars, and winter is passed in the first, though a few larvae of *O. obscurator* overwinter in the second. Pupation, which occurs in cocoons within the infested shoot, begins in mid-June, and the adults emerge from late June, when emergence of *R. buoliana* is at a peak, to late July. They fly at temperatures of 55–85° F., and the females mate and oviposit shortly after emerging. Newly emerged females were shown on dissection to contain 150–200 eggs each. Adults of *O. obscurator* feed on the flowers of umbelliferous plants [see preceding abstract] and near trees fly mainly about the lower half, whereas those of *C. interruptor* fly mainly about the upper. At an average temperature of 70° F., the average rate of dispersal per day was 165 ft. for males of both species and females of *C. interruptor* and about 84 ft. for females of *O. obscurator*.

TRIPP (H. A.). *Spathimeigenia spinigera* **Townsend (Diptera: Tachinidae), a parasite of** *Neodiprion swainei* **Middleton (Hymenoptera: Tenthredinidae).**—*Canad. Ent.* **92** no. 5 pp. 347–359, 15 figs., 7 refs. Ottawa, 1960.

Jack pine (*Pinus banksiana*), which has recently become of increased importance in Canada as raw material for pulp, is severely defoliated by *Neodiprion swainei* (Middleton), and studies on the parasites of this sawfly were begun in an area near the source of the Gatineau River, Quebec, in 1955. In this paper, information is given on the bionomics of *Spathimeigenia spinigera* Tns., which was the commonest parasite obtained, with descriptions of the larvae and puparia. Because of similarities between the immature stages and those of *S. aurifrons* Curr. [*R.A.E.*, A **19** 48], as described in an unpublished work by D. A. Ross, and between the available descriptions of the adults of these two species, *S.aurifrons* is regarded as a possible synonym of *S. spinigera*.

The Tachinid parasitises many species of sawflies in eastern North America [*cf.* **9** 267; **30** 182; **44** 371] and was reared from *N. swainei* wherever this host occurred in Quebec. The adults began to emerge about 20 days after those of *N. swainei*, and newly emerged individuals were present from 11th July until 22nd August. All larval stages of the host were attacked, but not the prepupal. The female inserts a larva directly into the body cavity, where it becomes attached first to a tracheal trunk and then, after hibernating, but before moulting, to the body wall of the host. The third-instar larva consumes practically all the body contents of the dead host, and forms its puparium within the host cocoon. There was only one generation a year. In the study area, *S. spinigera* accounted for 34 per cent. of the total parasitism, but in another one, with similar total parasitism, it was responsible for only 2·1 per cent. Superparasitism was fairly frequent, but only one parasite emerged per host; further mortality was due to hyperparasitism or multiparasitism. Other factors that decrease the efficiency of *S. spinigera* are encapsulation of the larvae by the host; the tendency of the parasite to complete its development in one year, so that in years following seasons when many feeding host larvae have been destroyed by unfavourable conditions the host population, which, in consequence is derived from diapause larvae, is relatively free from parasites; and the retarding effect of the parasite on the development of its host, which often prevents the latter from constructing its cocoon by early September and so escaping the effects of adverse weather conditions. *S. spinigera* can apparently thrive only when other parasites are at not more than an endemic level, but it reproduces rapidly and must be regarded as an important agent in control.

MACGILLIVRAY (M. E.) & BRADLEY (R. H. E.). *Myzus certus* **(Wlk.), an efficient vector of potato virus Y.**—*Canad. Ent.* **92** no. 5 pp. 367–368, 8 refs. Ottawa, 1960.

Myzus persicae (Sulz.) has hitherto been regarded as the most efficient vector of potato virus Y, but, in experiments in eastern Canada, *M. certus* (Wlk.) reared on pansy (*Viola tricolor*) was found to be equally efficient in transmitting it from infected to healthy tobacco and from infected to healthy potato plants. Both aphids fed on the source plant for less than 30 seconds and acquired the virus in as little as ten; after being left on the test plants overnight, their stylets were well inserted in the plants and they had produced numerous progeny. In North America, the known food-plants of *M. certus* are pansy and shepherd's purse (*Capsella bursa-pastoris*). An earlier finding that it fed on potato under glass [*R.A.E.*, A **43** 441] was confirmed in experiments in which it colonised five of seven varieties tested. In reply to criticisms by Hille Ris Lambers, the authors state that, although in 1952 the culture used in feeding experiments on potato contained both *M. certus* and *M. persicae* [*cf. loc. cit.*] in 1953, 1958 and 1959, reddish aphids collected from pansy and reared on potato were all *M. certus*; the senior author's identification of specimens from the same culture as the aphids used in the experiments on potato was verified by Hille Ris Lambers in 1960. With regard to the importance of *M. certus* as a virus vector in Europe, where it does not feed on potato, tulip or sugar-beet, it is pointed out that aphids may transmit virus to plants on which they do not normally feed or breed, since it has been shown that viruses are spread mainly by alates and that these may alight on plants, whether suitable as food-plants or not, and probe them before leaving [**48** 349]. Since attempts in Europe to rear *M. certus* on potato have failed, the form of the species present there possibly differs from the one in North America.

MARTIN (J. L.). **The bionomics of** *Profenusa thomsoni* (**Konow**) (**Hymenoptera: Tenthredinidae**) **a leaf-mining sawfly on** *Betula* **spp.**—*Canad. Ent.* **92** no. 5 pp. 376–384, 2 figs., 7 refs. Ottawa, 1960.

The following is largely the author's summary. *Profenusa thomsoni* (Konow) is a sawfly that mines the leaves of white, yellow and wire birch (*Betula papyrifera*, *B. alleghaniensis* (*lutea*) and *B. populifolia*) in the north-eastern United States and in Canada from New Brunswick to Manitoba. Infestations have occurred throughout most of north-eastern, central and southern Ontario since 1948, but its presence was not recognised before 1955 because it was confused with *Fenusa pusilla* (Lep.) [*cf. R.A.E.*, A **49** 79]; *P. alumna* (MacGill.) [*loc. cit.*] is a synonym of *P. thomsoni*. Investigations on its bionomics were carried out in central Ontario in 1956 and 1957 and showed that the adults emerge in mid-July and deposit their eggs singly in the upper surfaces of the leaves. The larvae feed through five instars and in the sixth enter the ground and overwinter as prepupae in soil cells. Pupation takes place in early summer. Although preference is shown for leaves less than 10 ft. from the ground in semi-protected, partly shaded situations, both large and small trees in almost every type of habitat are attacked during heavy infestations. Owing to the lateness of larval feeding, probably little or no appreciable injury is caused to the trees. Adults and larvae were attacked by ants and spiders, mortality of eggs was extremely high where larvae mined in the tissue beneath them, possibly owing to interference with their water balance, and many larvae died from shortage of food. About 22 per cent. of the prepupae were parasitised by Hymenoptera.

BLAIS (J. R.). **Spruce budworm parasite investigations in the Lower St. Lawrence and Gaspé regions of Quebec.**—*Canad. Ent.* **92** no. 5 pp. 384–396, 1 map, 14 refs. Ottawa, 1960.

During the outbreak of the spruce budworm [*Choristoneura fumiferana* (Clem.)] on balsam fir [*Abies balsamea*] in eastern Canada in 1949–58, large-scale applications of DDT were made from the air in New Brunswick and Quebec in 1952–58 and 1954–58, respectively. Population fluctuations in sprayed and unsprayed areas and their causes were studied in 18 plots in the Lower St. Lawrence and Gaspé Peninsula regions of Quebec in 1954–58, and the information obtained on the parasite complex is here recorded. The following is substantially the author's summary.

The relative abundance of parasite species varied between localities within years and between years. Most of the 25 encountered were rare or occasional. In the first four years, *Apanteles fumiferanae* Vier. and *Glypta fumiferanae* (Vier.) were the commonest. In the last year, *Meteorus trachynotus* Vier. and *Itoplectis conquisitor* (Say) showed spectacular increases. The aerial application of DDT over a period of five years did not appear to affect the parasites, with the possible exception of *Glypta*, which was less abundant in sprayed plots. The average yearly mortality through insect parasites for all the plots studied remained at a fairly constant level from 1954 to 1957, but increased considerably in the last year of the outbreak. The similarities and differences between the parasite complex in recent epidemics of *C. fumiferana* in the eastern United States and Canada [*cf.* **39** 234; **41** 207; **48** 249; **49** 192] and that in Quebec are briefly discussed. The increase in mortality through insect parasites in the final year appears to be the result of a general decline in numbers of *C. fumiferana* as a consequence of unfavourable weather [*cf.* **47** 504]. Parasites were, however, an important factor contributing to the final collapse of the outbreak.

Silver (G. T.). **The relation of weather to population trends of the black-headed budworm** *Acleris variana* **(Fern.) (Lepidoptera: Tortricidae).**—*Canad. Ent.* **92** no. 6 pp. 401–410, 6 refs. Ottawa, 1960.

The relation between the weather in 1950–58 and population fluctuations in *Acleris variana* (Fern.) on western hemlock (*Tsuga heterophylla*) in coastal areas of British Columbia was studied in an area on the mainland, the Queen Charlotte Islands and northern Vancouver Island, and the following is based on the author's summary of the results. Populations increased greatly immediately after 1–2 years in which rainfall during July and August was below average, and confirmation of this was found in an outbreak in the Queen Charlotte Islands in 1959, which occurred directly after the drought year of 1958. Populations reached their peak in 2–3 years. The three outbreaks studied all decreased and collapsed during or immediately after periods in the latter part of larval development in which precipitation was unusually heavy. Although weather effects were not investigated experimentally, the repetition of the same general pattern in nature strongly suggests that annual weather conditions might be very useful in predicting outbreaks, even with no more information than is at present available.

Harcourt (D. G.). **Biology of the diamondback moth,** *Plutella maculipennis* **(Curt.) (Lepidoptera: Plutellidae), in eastern Ontario. III. Natural enemies.**—*Canad. Ent.* **92** no. 6 pp. 419–428, 2 graphs, 38 refs. Ottawa, 1960.

The following is based almost entirely on the author's summary of this part of a series [*cf. R.A.E.*, A **47** 123]. During studies in eastern Ontario in 1952–56, the principal parasites of *Plutella maculipennis* (Curt.) recorded in permanent field plots of cabbage were the Ichneumonids, *Angitia* (*Horogenes*) *insularis* (Cress.) and *Diadromus plutellae* (Ashm.), which destroyed an average of 36 per cent. of the prepupae and 16 per cent. of the pupae, respectively. Less frequently recorded were the Braconid, *Microplitis plutellae* Mues., and an Ichneumonid of the genus *Campoletis*, both reared from the larvae, and the Eulophid, *Tetrastichus sokolowskii* Kurd., the Chalcidid, *Spilochalcis albifrons* (Walsh), the Ichneumonid, *Gelis tenellus* (Say), and the Pteromalids, *Dibrachys cavus* (Wlk.), *Eupteromalus viridescens* (Walsh) and *Habrocytus* sp. near *H. phycidis* Ashm., all from the pupae or prepupae; *E. viridescens* is a parasite of *A. insularis*. Predators recorded included birds, mites, spiders, Chrysopids and a Mirid larva. Deaths due to disease were negligible. In a brief discussion of the relations between populations of hosts and parasites, the author states that the rate of attack by both *A. insularis* and *D. plutellae* decreased with increasing host density [*cf. R.A.E.*, A **30** 428].

GRIFFITHS (K. J.). **Oviposition of the red-headed pine sawfly,** *Neodiprion lecontei* **(Fitch).**—*Canad. Ent.* **92** no. 6 pp. 430–435, 2 graphs, 7 refs. Ottawa, 1960.

In view of the suggestion that species of *Neodiprion* can be separated by the number and spacing of their eggs on the needles of their food-plants [*cf. R.A.E.*, A **32** 1] and the diverse results obtained with several species [*cf.* **45** 174; **48** 483], observations were made on the eggs of *N. lecontei* (Fitch) on red pine (*Pinus resinosa*) in Ontario in 1956 to determine whether the use of such characters for identification is justifiable. The females were found to prefer open-grown trees, which, however, varied in susceptibility, for oviposition. Egg-clusters were found only on foliage of the previous year, 87·5 per cent. of them in the apical and the remainder in the middle third of the shoot. The average number of eggs per cluster was about 120 [*cf.* **44** 371]. In 74·7 per cent. of 541 infested needle-bundles examined, the eggs were on only one needle of the pair. In 67·2 per cent. of the bundles with both needles infested, the eggs were laid on the edges farthest removed from each other; only 1·5 per cent. of 678 infested needles had eggs on both edges. The number of eggs per needle varied from one to 38, but was found not to be an intrinsically determined specific character. There was a statistically significant tendency for more eggs to be laid on long than on short needles, a negative correlation between needle width and egg spacing (expressed as the length of needle occupied by an egg and its distance from the next) and a strong positive one between needle width and needle length; the last correlation indicates that long needles bear most eggs not only because they can accommodate more but also because their greater width results in closer spacing. Less of the observed variation in average number of eggs per needle can be attributed to correlation with average needle length in *N. lecontei* than in *N. pratti banksianae* Rohw. [*cf.* **45** 174] because, owing to the considerably greater maximum length of the needles on red pine than on jack pine (*P. banksiana*), the process of oviposition is more prolonged and therefore affords more opportunity for interruption by predators or unfavourable conditions.

WELLINGTON (W. G.). **The need for direct observation of behaviour in studies of temperature effects on light reactions.**—*Canad. Ent.* **92** no. 6 pp. 438–448, 10 refs. Ottawa, 1960.

The following is virtually the author's summary. The changes in response to light that are shown by insects when heated in a dark–light alternative chamber are not accurately illustrated by methods that depend primarily on intermittent records of the positions of the insects without continuous reference to their individual behaviour. This is because increases in their activity or speed of movement while they are confined in a small space often carry them across the dark–light boundary before they can react to it. Since they move more slowly in the dark than in the light at any temperature, they may spend an increasing amount of time in the dark as temperature rises, even while they are still photopositive. Truly photonegative behaviour is characterised by reactions on the dark side of the boundary that turn the insect back towards the dark. These cannot be seen for every individual unless observations are continuous. No correct account of photic reversal in groups can be obtained, therefore, without actual observations of this changed orientation as it occurs in each individual in turn. If individual responses are neglected and the index of reaction intensity derived from a formula applied to position records is used instead, the indicated temperature for behavioural change within the group is always incorrect. Furthermore, it may lie either up or down the temperature scale from the place where true reversal is concentrated, so that the observer cannot know how to correct his calculation. Position records cannot be recommended, therefore, especially when laboratory results are destined for field application. Instead, calculations of group reversals should be based on collections of individual reversal temperatures accurately determined by direct observation. This can be done most easily by keeping groups small enough for rapid recognition of their constituent individuals and using an increased number of groups to preserve the quantitative content of results. These conclusions are illustrated by reference to experiments with larvae of *Halisidota argentata* Pack., *Diacrisia virginica* (F.) and *Malacosoma disstria* Hb.

Neilson (W. T. A.). **Field tests of some hydrolyzed proteins as lures for the apple maggot,** *Rhagoletis pomonella* (**Walsh**).—*Canad. Ent.* **92** no. 6 pp. 464–467, 12 refs. Ottawa, 1960.

The following is based on the author's summary. In experiments in an apple orchard in New Brunswick in 1957–59, enzymatic hydrolysates of soy-bean, casein, lactalbumin and yeast were each more effective as a lure for adults of *Rhagoletis pomonella* (Walsh) [*cf. R.A.E.*, A **42** 391] than a previously recommended bait of urea and sodium hydroxide [*cf.* **37** 342]. Enzymatic soy-bean and casein hydrolysates were more effective than two proprietary acid hydrolysates of maize protein. Soy-bean hydrolysate was the most attractive of the enzymatic hydrolysates. The materials were about equally attractive to the two sexes. Adults were not captured in traps until about a week after they had emerged, so that trapping records are unreliable for the timing of control sprays.

MacLellan (C. R.). **Cocooning behaviour of overwintering codling moth larvae.**—*Canad. Ent.* **92** no. 6 pp. 469–479, 10 figs., 12 refs. Ottawa, 1960.

The following is almost entirely the author's summary. In orchard experiments in Nova Scotia in 1958–59, of a number of fully grown larvae of the codling moth [*Cydia pomonella* (L.)] that were labelled with ^{32}P and released in September on fruits on the upper and lower thirds of apple trees or on the ground, most selected sites on the tree trunk for constructing their cocoons. Fully grown larvae released in the open moved at an angle of approximately 135° to the sun, whereas those released in shade under sunny conditions, during cloudy weather or at night sought the darkest shadows of various objects. Of the larvae released in the sun, 4 per cent. found tree trunks, as compared with 35 per cent. of those released in shade. Of the larvae released under the canopy of the trees in cloudy weather and at night, 64 and 68 per cent., respectively, found tree trunks. Four larvae released at night outside the canopy of an apple tree moved irregularly and none found the trunk. These results indicate that larvae of *C. pomonella* seek the darkest areas in which to spin their cocoons.

Burnett (T.). **An insect host-parasite population.**—*Canad. J. Zool.* **38** no. 1 pp. 57–75, 9 figs., 12 refs. Ottawa, 1960.

The following is virtually the author's summary. Eight populations of *Trialeurodes vaporariorum* (Westw.) and *Encarsia formosa* Gah. were propagated on tomato plants in the greenhouse for about eight months. Although there was some variation in the growth-forms of the populations of host and parasite among the experiments, the general trend in each experiment was one of fluctuations of slightly, but distinctly, increasing amplitude. As extraneous sources of variation had only a slight influence on the growth-forms, the fluctuations resulted from host-parasite interaction. Combined populations of these two species are well suited for an investigation of the principles of host-parasite interaction.

Harris (P.). **Production of pine resin and its effect on survival of** *Rhyacionia buoliana* (**Schiff.**) (**Lepidoptera: Olethreutidae**).—*Canad. J. Zool.* **38** no. 1 pp. 121–130, 1 pl., 2 figs., 12 refs. Ottawa, 1960.

The following is almost entirely the author's abstract of this account of investigations in southern England in 1956–57. The survival of larvae of *Rhyacionia buoliana* (Schiff.) on Scots pine (*Pinus sylvestris*) is related to the amount of resin encountered during the initial attack on the buds, the larvae being unable to establish themselves in very resinous buds. The resin canals in the buds are developed in response to short days at the end of summer, while the development of *R. buoliana* is positively correlated with summer temperature. Thus, more larvae survive in a warm than in a cool summer because they attack the buds before there is a well-developed resin protection. Also, fewer larvae survive on the very resinous Corsican pine (*P. nigra*) than on *P. sylvestris*. However, the best survival was found on lodgepole pine (*P. contorta*), which was also more resinous than *P. sylvestris*; it is presumed that the larvae can more easily remove the resin of this than of the other species from their mines.

Atwal (A. S.). **Influence of temperature, duration of conditioning, and age of** *Anagasta* (*Ephestia*) *kühniella* (**Zell.**) (**Lepidoptera: Pyralidae**) **on acclimation to a sub-zero temperature.**—*Canad. J. Zool.* **38** no. 1 pp. 131–141, 4 graphs, 9 refs. Ottawa, 1960. **Influence of temperature and duration of conditioning on oxygen consumption and specific gravity of the haemolymph of** *Anagasta* (*Ephestia*) *kühniella* (**Zell.**) (**Lepidoptera: Pyralidae**).—*T.c.* pp. 143–148, 8 refs.

The following paragraphs are substantially the author's abstracts of these two papers.

When pupae of *Anagasta kühniella* (Zell.) aged 0·5, 1·5, 2·5, 3·5 and 4·5 days were conditioned at 5, 10, 15, 20 or 25°C. [41, 50, 59, 68 and 77°F.] for one, two, four, eight or 16 hours, the mortality due to subsequent exposure at −15°C. [5°F.] for four hours was affected by their age and the temperature and duration of conditioning. As the temperature of conditioning was lowered from 25 to 10°C., mortality due to the sub-zero exposure gradually decreased; when the pupae were conditioned at 5°C., mortality increased again. When they were conditioned for 1–16 hours, the lowest average mortality was among pupae conditioned for four hours; mortality was highest after conditioning for one and 16 hours. Regardless of the temperature and duration of conditioning, mortality due to sub-zero exposure increased as pupal age increased. Pupae conditioned at 10°C. and subsequently exposed at 25°C. for 2–8 hours before sub-zero exposure exhibited a gradual increase in mortality, showing a tendency to reach the same high level as did pupae that had not been conditioned at 10°C. Adults exposed to −15°C. for various periods when 1·5, 2·5, 3·5, 4·5, 5·5 or 6·5 days old exhibited only a slight difference in the time required for 50 per cent. mortality in each of the age groups; the two oldest groups required the shortest exposures, of 50–60 minutes. Moths of a given age group, when conditioned at 10°C., exhibited higher mortality after sub-zero exposure than did the controls; hence, there was no acclimatisation. Without a subsequent sub-zero exposure, conditioning at 10°C. had no lethal effect.

Acclimatisation in pupae of *A. kühniella* within the range of normal temperatures was not associated with changes in the rate of oxygen consumption or specific gravity of the haemolymph. Only when the pupae were conditioned at the extreme temperatures of 5 and 35°C. [95°F.] for about 16 and eight hours, respectively, did their haemolymph become more concentrated. This was not due to desiccation. Thus, the theory of osmoregulation [*cf. R.A.E.*, A **46** 331] does not satisfactorily explain the phenomenon of thermal acclimatisation.

Adams (J. B.). **Effects of spraying 2,4-D amine on Coccinellid larvae.**—*Canad. J. Zool.* **38** no. 2 pp. 285–288, 7 refs. Ottawa, 1960.

In 1958, predacious Coccinellid larvae collected in New Brunswick from grain fields that had been sprayed with herbicides soon died, whereas those from untreated fields survived, and the effect of 2,4-D amine (mixed amine salts of 2,4-dichlorophenoxyacetic acid) on Coccinellid predators was accordingly investigated. When larvae of *Coccinella transversoguttata* Fald., *Hippodamia tredecimpunctata* (L.) and *C. trifasciata perplexa* Muls. obtained from adults collected in July 1959 were sprayed with the herbicide at 1, 3, 6, 9 and 12 days of age, larval mortality was four or more times and total mortality about 2–3 times as high in each age group as among unsprayed controls. The mean period of larval development was extended in all age groups except the youngest. Herbicides are usually applied when grain crops are 6–8 in. high, and aphids are present while its height is between 2½ and 30 in. Surveys in 1956 established that Coccinellid adults and larvae become numerous early in aphid infestations in fields not treated with insecticides. If delayed only slightly, therefore, as happens if the weather is unfavourable, the application of a herbicide would coincide with the presence of the larvae.

Wellington (W. G.). **Individual differences as a factor in population dynamics: the development of a problem.**—*Canad. J. Zool.* **35** no. 3 pp. 293–323, 9 pls., 16 refs. Ottawa, 1957. **Qualitative changes in natural populations during changes in abundance.**—*Op. cit.* **38** no. 2 pp. 289–314, 8 refs. 1960.

The following is taken almost entirely from the author's abstract of the first paper. In order to assess the importance of individual variation in the population dynamics of an insect, an outbreak of *Malacosoma pluviale* (Dyar) on deciduous trees in southern British Columbia was studied in detail in 1956. Larvae were classified into four groups by differences in their total activity and behaviour on emergence, and the proportions of the different types per egg-mass were determined. The differences obtained were found to be associated with different feeding habits and rates of food consumption and development, as well as with different chances for survival in particular environments or in the presence of disease. Colonies in new infestations consisted largely of active individuals, whereas less active individuals occurred with increasing frequency as infestations became older and heavier. Adult activity also varied, and more active moths appeared to be responsible for production of active colonies, especially in new infestations most distant from original source areas. The population would have to be followed through its eventual decline to its next increase before complete information could be obtained, but the evidence was sufficient to formulate an acceptable working hypothesis, namely, that proportions of the different types within the population would show annual as well as areal changes. Moreover, the fact that the insect is colonial is not especially significant, since similar differences in total activity can be detected among species with solitary habits.

The following is based on part of the author's abstract of the second paper, which is the first of a proposed series dealing with studies of the population of *M. pluviale* between 1956 and 1959, when the outbreak was collapsing. Accounts are given of the four categories of larval activity and behaviour defined in the first paper and of the biological consequences of mixing different proportions of active and sluggish larvae in colonies. A colony with enough active individuals built several long, clavate tents, dispersed them widely and foraged far away from them. A colony with many sluggish individuals seldom constructed more than one compact, pyramidal tent, and fed nearby. Sluggish colonies were less viable than active ones in harsh environments, and some were too sluggish to survive in the most favourable circumstances. Between 1956 and 1959, fourth-instar colonies along 156 miles of roads in the outbreak area decreased from 74,000 to 251. In any infestation, the percentage of active colonies declined from nearly 100 to 45–55 as years of residence in the locality increased from one to four. Thereafter, the proportion of active colonies rose as those too sluggish to survive disappeared. The initial percentage decline in active colonies occurred whether numbers were increasing or decreasing, but the later percentage increase began only while numbers were decreasing. As infestations aged, even active colonies decreased in size and activity, but the year of minimal density was accompanied by increases in colony size and vitality. This rejuvenation was also reflected in data from adults and egg-masses. Methods of using egg-mass data to determine the proportions of different kinds of colonies in infestations of different ages are discussed, and adult activity indices based on scale loss and wing tearing are given. Examples from all three sources indicated declining vitality while the population aged [*cf. R.A.E.*, A **35** 236; **40** 16], followed by sudden recovery at or near minimal abundance when its least viable portion had been eliminated.

Paredes (P. P.). **Sobre la distribución de** *Diatraea rosa* **(Heinr.) y** *D. busckella* **Dyar & Heinr. en el Estado Yaracuy.** [On the distribution of *D. rosa* and *D. busckella* in the State of Yaracuy.]—*Agron. trop.* **9** no. 3 pp. 105–107, 1 map, 1 ref. Maracay, 1959. (With a summary in English.)

Angeles (N.) & Paredes (P.). **Nueva área de distribución para** *Diatraea rosa* **(Heinr.).** [New area of distribution for *D. rosa.*]—*T.c.* no. 4 pp. 133–136, 1 map, 2 refs. 1960. (With a summary in English.)

Investigations on the distribution of *Diatraea* spp. on sugar-cane in Venezuela up to 1949 showed that *D. busckella busckella* Dyar & Heinr. occurred in the west and *D. rosa* Heinr. in the centre and east [*cf. R.A.E.*, A **39** 93]. Since that date, *D. b. busckella* has spread to the east and displaced *D. rosa*, appearing east of Chivacoa in 1959. This spread is described and illustrated on a map in the first paper. In the second, *D. rosa* is recorded from the Andine region, in the State of Táchira, where it appeared as the result of the introduction of infested cane from Carabobo.

Angeles (N.), Szumkowski (W.) & Paredes (P. P.). *Diatraea saccharalis* **(F.), plaga del arroz en Venezuela.** [*D. saccharalis*, a pest of rice in Venezuela.]—*Agron. trop.* **9** no. 4 pp. 127–132, 1 graph, 6 refs. Maracay, 1960. (With a summary in English.)

Diatraea saccharalis (F.) was found severely infesting rice in the Venezuelan State of Portuguesa in 1957 and in Guárico in 1959. Wild grasses were also attacked. Rice in the second area was in addition infested by *Zeadiatraea lineolata* (Wlk.), and adults were obtained, indicating that the occurrence was not accidental. *Metagonistylum minense* Tns. was released against *Diatraea* in Guárico, and puparia of the Tachinid were subsequently recovered, the parasitism percentages being 8·5–16·6.

Ruffinelli (A.) & Carbonell (C. S.). **Segunda lista de insectos y otros artrópodos de importancia económica en el Uruguay.** [Second list of insects and other arthropods of economic importance in Uruguay.]—*Rev. Asoc. Ingen. agrón.* no. 94 (1953) pp. 33–82, 60 refs. Montevideo, 1954.

This briefly annotated, systematic list of over 590 arthropods of economic importance in Uruguay includes more than 560 insects and arachnids that are of agricultural, medical or veterinary importance, or are troublesome in houses, or are beneficial. A similar list of some 35 other invertebrates is given in an appendix, together with alphabetical lists of food-plants and host animals.

Tuthill (L. D.). **Los Psyllidae del Perú central (Insecta: Homoptera).** [The Psyllids of central Peru.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 1–27, 28 figs., 32 refs. Lima, 1959. (With a summary in English.)

Descriptions are given of 29 species of Psyllids in 13 genera, collected in central Peru. Six of the genera and 27 of the species are new, and the latter include three that attack crop plants. These are *Trioza perseae*, sp. n., on avocado, *Jenseniella psidii*, gen. et sp.n., on guava, and *Russelliana solanicola*, gen. et sp.n., on potato. The last occurs in the Arequipa region and has only recently begun to attack potato, of which it seems likely to become a major pest. One of its wild food-plants is *Datura* sp. Keys to the genera and species are included.

Wille (J. E.). **Las posibilidades y limitaciones del "control biológico" en el combate de insectos del algodonero.** [The possibilities and limitations of biological control in the battle against cotton pests.]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 28–29. Lima, 1959.

The author points out the limitations of insecticides for use against pests of cotton in Peru, of which *Dysdercus peruvianus* (Guér.), *Mescinia peruella* Schaus and *Eutinobothrus gossypii* (Pierce) require control, and the advantages of using biological and cultural methods where these are practicable, which is not always the case.

Herrera A. (J. M.). **Nuevo equipo y técnica para la crianza masiva de avispas del género** *Trichogramma.* [New equipment and technique for the mass rearing of species of *Trichogramma.*]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 30–35, 10 figs., 10 refs. Lima, 1959. (With a summary in English.)

Equipment designed in California for rearing egg-parasites of the genus *Trichogramma* is in use in Peru for the mass production of these parasites for release against various pests of crops, and both it and the rearing process, which is carried out in eggs of *Sitotroga cerealella* (Ol.), are described. Information on the dispersion of the parasites from the site of release is conflicting, and observations by Lobatón in the Pisco Valley [*R.A.E.*, A **49** 118] showed that parasitism of the eggs of *Mescinia peruella* Schaus on cotton fell from 54 to 35 per cent. as the distance from the release point increased from about 4 to 10 yd.

Beingolea G. (O. D.). **Notas sobre la bionómica de arañas e insectos benéficos que ocurren en el cultivo de algodón.** [Notes on the bionomics of spiders and beneficial insects occurring in cotton crops.]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 36–44, 19 refs. Lima, 1959. (With a summary in English.)

Lists are given of 29 species of insect predators and 25 species of insect parasites commonly associated with pests of cotton in Peru, showing their prey or hosts, and their importance is discussed.

Lamas (J. M.). **El estado del problema del "gorgojo de la chupadera" en el Valle de Huaura.** [The position of the problem of *Eutinobothrus gossypii* in the Huaura Valley.]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 45–50, 1 map, 9 refs. Lima, 1959. (With a summary in English.)

Eutinobothrus gossypii (Pierce) is a serious pest of cotton in Peru. It was formerly of importance only on the coast north of the Jequetepeque Valley, but was found in the Huaura Valley in February 1958, having probably been introduced with seed cotton for ginning. Measures for the prevention of further spread and for the control of the weevil in the infested areas are discussed.

Beingolea G. (O. D.). **Notas sobre** *Hyalochloria denticornis* **Tsai Yu-Hsiao (Hemip.: Miridae) predator de los huevos de** *Anomis texana* **Riley (Lepidop.: Noctuidae).** [Notes on *H. denticornis*, a predator of the eggs of *A. texana.*]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 51–59, 6 figs., 9 refs. Lima, 1959. (With a summary in English.)

The author describes all stages and the bionomics of *Hyalochloria denticornis* Hsiao, which preys on two pests of cotton in Peru, *Aphis gossypii* Glov.

in winter and the eggs of *Anomis texana* Ril. in summer. Development of the Mirid lasts 30–45 and 20–29 days at these two seasons, respectively.

BEINGOLEA G. (O. D.). **Nota sobre** *Encarsia* **spp. (Hymenop.: Aphelinidae) parásito de los huevos de** *Anomis texana* **Riley (Lepidop.: Noctuidae).** [A note on *Encarsia* spp., parasitic in the eggs of *A. texana*.]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 59–64, 2 figs., 10 refs. Lima, 1959. (With a summary in English.)

The following is based on the author's summary. Observations are recorded on two unidentified species of *Encarsia*, of which the females develop in the nymphs of Aleyrodids and the males (of at least one and probably both) in the eggs of Lepidoptera, in Peru; both also produce males in the Aleyrodid hosts, one doing so frequently and the other rarely. They afford control of several Lepidopterous pests of cotton, including *Anomis texana* Ril., *Heliothis virescens* (F.), *Eulia* (*Arygrotaenia*) *sphaleropa* (Meyr.) and a species of *Platynota* near *P. rostrana* Wlk.

BEINGOLEA G. (O. D.). **El problema de la " mosca blanca lanuda " de los cítricos, en el Perú** *Aleurothrixus floccosus* **(Homop.: Aleurodidae).** [The problem of the *Citrus* whitefly, *A. floccosus*, in Peru.]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 65–68, 2 figs., 22 refs. Lima, 1959. (With a summary in English.)

Aleurothrixus floccosus (Mask.) is an important pest of *Citrus* in Peru, and the author reviews its morphology, bionomics, natural enemies and control and the damage caused. It feeds on the leaves, development lasting a month, and covers them with honeydew; sprays of parathion gave good control.

RISCO B. (S. H.). **Una investigación en relación a la infestación de** *Diatraea saccharalis* **Fabr., en las plantaciones de caña de azúcar en el Valle de Huánuco.** [An investigation in connection with the infestation of sugar-cane plantations by *D. saccharalis* in the Huánuco Valley.]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 74–77, 7 figs. Lima, 1959.

Observations in the Huánuco Valley of Peru showed that infestation of sugar-cane by *Diatraea saccharalis* (F.) was high, owing principally to the ineffectiveness of natural enemies. *Paratheresia claripalpis* (Wulp), which parasitises the larvae, was present, but was apparently hindered by strong winds. Artificial rearing and release to supplement the natural population of the parasite are suggested.

SALAZAR TORRES (J.). **Dos insectos observados atacando al arroz en el Valle de Jequetepeque:** *Orthezia graminis* **Tinsley (Orthezin.) y** *Nyctelius nyctelius* **(Latr.) (Hesperid.).** [Two insects observed attacking rice in the Jequetepeque Valley: *O. graminis* and *N. nyctelius*.]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 77–81. Lima, 1959. (With a summary in English.)

Rice in the Jequetepeque Valley of Peru is infested by a Coccid, *Orthezia graminis* Tinsley, and a Hesperiid, *Nyctelius nyctelius* (Latr.). Observations in May 1958 showed that larvae of the Drosophilid, *Gitona brasiliensis* Costa Lima, develop in the egg sacs of the former and feed on the eggs, and that the larvae of *Nyctelius* are destroyed by spiders and the eggs and pupae parasitised by *Trichogramma minutum* Ril. and *Brachymeria* sp., respectively, of which only the last affords much control.

Simón (J. E.) & Arellano (M.). **Control del barreno** *Diatraea saccharalis* **con insecticidas orgánicos.** [Control of the borer *D. saccharalis* with organic insecticides.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 81–83, 3 refs. Lima, 1959.

In tests of sprays for the control of *Diatraea saccharalis* (F.) on maize in Peru, the best results were given by endrin at 0·45 lb. per acre, which reduced the infestation from 22 to 6 per cent. and was more effective than nine other organic compounds.

González B. (J. E.). **Datos preliminares sobre la distribución y control de los insectos de frijol en el Perú.** [Preliminary data on the distribution and control of the insect pests of beans in Peru.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 84–86. Lima, 1959.

A table is given showing the numerous insects that attack *Phaseolus* beans in Peru, the districts in which they occur, and their importance; their control by insecticides is briefly discussed.

Alza D. (A.). **Normas y conocimientos preliminares en el estudio de la migración del arrebiatado** (*Dysdercus peruvianus* **Guerin) en la Costa Central.** [Preliminary data for the study of the migration of *D. peruvianus* on the central coast.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 86–91, 5 figs., 8 refs. Lima, 1959. (With a summary in English.)

Dysdercus peruvianus (Guér.) is well known as a pest of cotton in the coastal valleys of Peru, but its habitats after the cotton is picked and its movements across the desert areas separating the valleys have been little studied. Data collected at nine points in the central coast area are presented as to its movement into the Carabayllo Valley [*cf.* next abstract].

Saldarriaga Y. (J.). **Contribución al estudio de las migraciones del arrebiatado.** [Contribution to the study of the migrations of *Dysdercus peruvianus*.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 105–108, 5 figs., 3 refs. Lima, 1959. (With a summary in English.)

This is a discussion of the migrations of *Dysdercus peruvianus* (Guér.) from the district of the Chancay Valley to cotton in the Carabayllo Valley, on the central coast of Peru [*cf.* preceding abstract]. Traps were set up in the intervening desert zone, some 20–25 miles wide, and it was found that migration proceeded along a wide front, was rapid and continuous and reached crops on the far side of the Valley about a month after it reached the nearest ones.

García B. (G.). **Contribución al estudio de la resistencia del arrebiatado, *Dysdercus peruvianus* Guerin, al hexacloruro de benceno.** [Contribution to the study of the resistance of *D. peruvianus* to BHC.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 91–102, 8 figs., 12 refs. Lima, 1959. (With a summary in English.)

Dysdercus peruvianus (Guér.) is commonly controlled on cotton in Peru by treatment with BHC, but has developed a resistance to this insecticide in some districts. Experiments were carried out with a resistant strain from the Virú Valley and a susceptible laboratory strain that had never been exposed to insecticides. Both were treated in the adult stage with sprays of BHC, thiometon (Ekatox), parathion (Folidol E-605) and malathion throughout ten generations, and susceptibility to BHC was tested in the 11th generation, in comparison with an untreated series. It was found that the resistance to BHC of the BHC-resistant strain was maintained, whatever the treatment applied; susceptibility to the other insecticides underwent no change in the course of the experiment.

González B. (J. E.). **Los daños del arrebiatado con relación a la edad de las bellotas.** [The damage caused by *Dysdercus peruvianus* in relation to the age of the bolls.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 102–105, 8 refs. Lima, 1959. (With a summary in English.)

Dysdercus peruvianus (Guér.) injures cotton bolls in Peru by feeding on them and by introducing fungi and bacteria into the feeding sites. When adults were confined on bolls of different ages on the same plants, it was found that damage began on bolls three days old, reached 100 per cent. on bolls 3–45 days old, fell to 58·3 per cent. on bolls 46–51 days old and was nil after 51 days. Control should therefore be begun as soon as the crop comes into bloom.

Martin Ravines (H.). **Algunas observaciones sobre dos formas de ataque del *Bucculatrix* (perforador de la hoja del algodonero).** [Some observations on two forms of attack by *Bucculatrix* (the cotton leaf perforator).]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 109–110, 1 ref. Lima, 1959.

This is a discussion of the differing habits of *Bucculatrix thurberiella* Busck and *B. gossypiella* Morrill [*cf. R.A.E.*, A **35** 76] in attacking the leaves of cotton in Peru. The differences are thought to be of an ecological nature, and a morphological study of the two species is suggested.

[Martin Ravines (H.).] **Algunos datos sobre parásitos y predatores del *Bucculatrix* en el Valle del Chira.** [Some data on parasites and predators of *Bucculatrix* in the Chira Valley.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 110–111. Lima, 1959.

Bucculatrix is an important pest of cotton in the Chira Valley of Peru. Its natural enemies are reviewed from observations in 1958; many of them are unidentified as to species.

[Martin Ravines (H.).] **Una nueva avispa parásita del *Bucculatrix*.** [A new Hymenopterous parasite of *Bucculatrix*.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 111–112. Lima, 1959.

Notes are given on the habits of an unidentified Eulophid close to the genus *Sympiesis*, which was found to be an important parasite of the larvae of

Bucculatrix mining the leaves of cotton in the Chira Valley of Peru. The life-cycle was completed in ten days in summer and more than 15 in autumn and winter, and the parasite is thought suitable for mass rearing in the laboratory.

LOBATÓN M. (M.). **Equilibrio biológico de** *Mescinia peruella* **Schaus, en la Zona Baja del Valle de Pisco, campaña 1958–59.** [Biological equilibrium of *M. peruella* in the lower Pisco Valley, 1958–59.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 113–115, 3 graphs. Lima, 1959.

Mescinia peruella Schaus caused severe damage to cotton in the Pisco Valley of Peru in 1957–58, but was much less injurious in 1958–59, as a result of cultural measures and the action of natural enemies, notes on which are given.

ALZA D. (A.). **Notas sobre potencial biótico del arrebiatado.** [Notes on the biotic potential of *Dysdercus peruvianus.*]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 115–116, 1 fig., 3 refs. Lima, 1959.

Observations on *Dysdercus peruvianus* (Guér.) in the Carabayllo Valley of Peru showed that the ratio of males to females must be at least 3:2 for 100 per cent. of the eggs to be fertilised. Not all the females are able to pair, and the effective sex ratio may therefore vary widely from the actual. The adults are resistant to hunger.

WEYRAUCH (W.) & MERINO S. S. (E.). **Apuntes sobre la biología y el combate del " gorgojo de la chupadera " en el Valle de Huaura.** [Notes on the bionomics and control of *Eutinobothrus gossypii* in the Huaura Valley.]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 117–118, 1 ref. Lima, 1959.

Eutinobothrus gossypii (Pierce) is an important pest of cotton in the Huaura Valley of Peru, the larvae boring in the stems and roots and weakening or killing the plants. The adults shelter in the soil close to the plant-collar during the day and are active at night, when they feed superficially on the leaves and shoots; they are apparently unable to fly. In summer, they survived for up to two months in the laboratory when food was provided, but died in two weeks without food. Cultural measures of control, including a close period of at least 60 days, are advocated for control.

MERINO S. S. (E.). **La avispa** *Rogas* (**Braconidae**) **en el control biológico del gusano de la hoja del algodonero.** [Braconids of the genus *Rogas* in the biological control of *Anomis texana.*]—*Rev. peruana Ent. agríc.* **2** no. 1 pp. 118–119. Lima, 1959.

Rogas sp. is an important parasite of *Anomis texana* Ril. on cotton in several parts of Peru and has been liberated artificially in some valleys in which it did not occur. Its life-cycle is completed in two weeks, whereas that of *Anomis* requires four, it attacks the larvae in first or second instar and destroys them by the third or fourth and is very prolific. As a result, it provides more effective control than do arsenical insecticides. Directions for artificial liberation are given.

Salazar T. (J.). **Un método práctico para fumigación de granos almacenados.** [A practicable method of fumigating stored cereals.]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 119–120, 1 fig. Lima, 1959.

A quantity of bagged maize at the Peruvian post of Matarani became infested by *Sitophilus oryzae* (L.) in 1956. The grain was fumigated in stacks covered with polyvinyl sheeting, methyl bromide being used at 1 lb. per 15 cu. m. The treatment proved satisfactory.

González B. (J. E.). **Investigación sobre la voracidad del arrebiatado, en el algodonero.** [Investigations of the voracity of *Dysdercus peruvianus* on cotton.]—*Rev. peruana Ent. agric.* **2** no. 1 pp. 120–121. Lima, 1959.

Investigations in Peru in which pairs of *Dysdercus peruvianus* (Guér.) were caged on cotton plants for 49 days showed that an average of 72 bolls was damaged per pair; there was no preference for bolls of a particular age. It is concluded that even a small population can cause considerable damage in the field and should be controlled.

Todd (D. H.). **Virus disease effectively controls white butterfly.**—*N.Z. J. Agric.* **100** no. 1 pp. 83, 85, 3 figs., 1 ref. Wellington, N.Z., 1960.

Recent surveys in the North Island of New Zealand showed that *Pieris rapae* (L.), which is one of the commonest pests of cruciferous crops, including rape, turnip and swedes, is checked each season by a virus disease and to some extent by the introduced parasite, *Pteromalus puparum* (L.) [*cf.* *R.A.E.*, A **48** 410, etc.]. Account should be taken of this before insecticide treatment is adopted.

Dodd (A. P.). **The biological control of prickly pear in Australia.** [*In*] Keast (A.), Crocker (R. L.) & Christian (C. S.). Ed. **Biogeography and ecology in Australia.**—*Monogr. biol.* **8** pp. 565–577, 2 pls., 3 refs. The Hague, W. Junk, 1959.

An account is given of the successful campaign for the control of noxious weeds of the genus *Opuntia*, chiefly *O. inermis* and *O. stricta*, in Queensland and New South Wales, where over 60 million acres were infested in 1925, by means of introduced insects [*cf.* *R.A.E.*, A **25** 78; **29** 587, etc.], together with information on the life-cycle and habits of *Cactoblastis cactorum* (Berg.), which proved to be the most effective. Only one introduction of the latter was made, in 1925. In Queensland, complete control was quickly achieved and has been maintained for at least ten years. Seedlings of *O. inermis* and *O. stricta* appear as isolated plants or in widely scattered groups over a large part of the State, but are attacked by *Cactoblastis* within a year or two; their destruction by chemical means is discouraged. Further distributions of *Cactoblastis* have been unnecessary. In New South Wales, the extensive areas of *Opuntia* in the north-west were quickly destroyed, but control of the stunted, chlorotic plants of *O. inermis* on poorer soils on timbered ridges [*cf.* **25** 78] was slow, and the Pyralid has failed to control *O. inermis* on basalt soils at altitudes of 2,000–3,000 ft., where food conditions and low temperatures are unsuitable for it. The policy in this State is eradication, and the destruction of scattered plants by chemical means is enforced, even where they are attacked by *Cactoblastis*.

Kilpatrick (D. T.). **San José scale.**—*J. Dep. Agric. S. Aust.* **63** no. 5 pp. 208–210, 4 figs., 3 refs. Adelaide, 1959.

Quadraspidiotus perniciosus (Comst.) was found for the first time in South Australia on deciduous fruit trees in the lower Murray area in 1958. An attempt to eradicate the Coccid by means of three applications of a winter oil-emulsion spray, two also including lime-sulphur, was not completely successful, though it reduced populations to negligible proportions. Information on the food-plants, bionomics and control of the Coccid [*cf. R.A.E.*, A **48** 146] is included.

Cant (R. R.). **Leaf scorch of pears caused by two-spotted mite.**—*J. Dep. Agric. S. Aust.* **63** no. 7 pp. 294–295, 307, 1 fig. Adelaide, 1960.

Pear trees in the Murray Irrigation Areas of South Australia have, since 1936, developed a severe leaf scorch (withering of the leaves and heavy defoliation) in January and February, especially under hot, dry conditions, and in 1958 the cause was shown to be infestation by *Tetranychus telarius* (L.), which had not hitherto been reported as a pest of fruit trees in the district. In preliminary tests in February 1958, a spray of 1 lb. Trithion and 2 pints white oil per 100 gal. gave complete control in three days on trees with infestations of up to 30 mites per leaf. Eight days after treatment, no more scorch had appeared on the treated trees, despite several days of hot, dry weather, whereas unsprayed trees were severely scorched and defoliated. Three weeks after treatment, the difference between sprayed and unsprayed trees was still more marked; occasional mites were then found on the sprayed trees, but large populations of both adult and immature mites had developed on the unsprayed ones. In large-scale trials, sprays of HETP (hexaethyl tetraphosphate) and TEPP prevented the development of scorch.

In an editorial foot-note, it is stated that experience over the past two years confirmed that a single application of Trithion is effective against *T. telarius* and showed that azinphos-methyl (Gusathion), malathion and parathion also controlled it when applied against the codling moth [*Cydia pomonella* (L.)] in a full schedule. There was evidence that *T. telarius* was becoming resistant to Trithion and other organic phosphates in some orchards, and Tedion is recommended in these cases. Severe leaf scorch was observed after a heat wave on trees with only 2–3 mites per leaf.

Hirano (C.) & Ishii (S.). **Effect of fertilizers on the growth of larvae of the rice stem borer,** *Chilo suppressalis* **Walker. III. Relation between application of phosphorus fertilizer and the growth of larvae.** [*In Japanese.*]—*Jap. J. appl. Ent. Zool.* **3** no. 2 pp. 86–90, 30 refs. Tokyo, 1959. (With a summary in English.)

The experiments recorded in this part of a series [*cf. R.A.E.*, A **49** 388, etc.] showed that the use of fertilisers containing phosphorus has little or no effect on the growth of the larvae of *Chilo suppressalis* (Wlk.) on rice in Japan.

Naitō (A.) & Ōsaka (K.). **Occurrence of the soy bean pod gall midge and its Hymenopterous parasites in Kantō District, and notes on the parasites.** [*In Japanese.*]—*Jap. J. appl. Ent. Zool.* **3** no. 2 pp. 91–98, 5 figs., 10 refs. Tokyo, 1959. (With a summary in English.)

An unidentified species of *Asphondylia*, first reported in 1924, has become an important pest of the pods of soy bean in Japan. Investigations at

Konosu, Saitama, in 1955–57 showed that the population of the Cecidomyiid fluctuates at a low level from June to mid-August, but then increases rapidly, reaching a peak in September; it remains high until early October. The larvae were parasitised by *Tetrastichus sayatamabae* Ishii, *Philomacroploea pleuralis* (Ashm.), *Pseudocatolaccus sayatamabae* Ishii and *P. tamabae* Ishii, of which the first two were of some importance and the others rare.

Ichinose (T.). **Studies on the bionomics of the Asiatic common looper, *Plusia nigrisigna* Walker, and its several allied species (Noctuidae). I. On the nomenclature of *Plusia nigrisigna* Walker.** [*In Japanese.*]—*Jap. J. appl. Ent. Zool.* **3** no. 2 pp. 99–106, 1 pl., 2 figs., 29 refs. Tokyo, 1959. (With a summary in English.)

Ichinose (T.) & Shibuya (S.). **II. Effects of temperatures on the development of the Asiatic common looper, *Plusia nigrisigna* Walker.** [*In Japanese.*]—*T.c.* no. 3 pp. 157–163, 1 graph, 12 refs. (With a summary in English.)

In the first part of this paper, the author discusses the generic classification of *Autographa* (*Plusia*) *nigrisigna* (Wlk.), which is one of the common pests of cabbage and other vegetables near Tokyo and is widely distributed elsewhere in Japan. It was placed in *Autographa* by Inoue & Sugi in 1948, but from a study of the larvae the author considers it referable to *Anagrapha*. Nevertheless, pending a revision of the Japanese species of the genus *Plusia*, *sens. lat.*, which cannot yet be carried out because of insufficient knowledge of larval characters, he prefers for the present to leave it in *Plusia*. It closely resembles *Autographa* (*P.*) *gamma* (L.) in morphology and feeding habits and may have been misidentified as the latter in Japan; so far as the author is aware, the true *A. gamma* has not been found in that country. The adult morphology, larval chaetotaxy and bionomics of the two species are compared in a table.

Experiments on the effect of temperature on the development of the Noctuid are described in the second paper. In crowded cultures, the thresholds of development for the eggs, larvae and pupae were 8, 8–9·6 and 12·4°C. [46·4, 46·4–49·28 and 54·32°F.], respectively, and the sum of effective temperatures 66·7, 223·6 and 101·8 day-degrees C. [120, 402·5 and 183·25 F.]; crowding had no adverse effects. Adults given access to sugar solutions survived for 17 days at about 22°C. [71·6°F.] and 9 days at about 28°C. [82·4°F.], with no differences between sexes. There was no diapause, and five generations could thus develop in the year near Tokyo.

Hirao (J.). **Studies on the local variation in the bionomics of the rice stem maggot, *Chlorops oryzae* Matsumura. I. Differences in some biological habits showed by two regional stocks of the rice stem maggot reared under the same natural conditions.** [*In Japanese.*]—*Jap. J. appl. Ent. Zool.* **3** no. 2 pp. 107–114, 1 pl., 3 graphs, 17 refs. Tokyo, 1959. (With a summary in English.)

On rice in Japan, *Chlorops oryzae* Mats. has two generations a year in the north and three in the south [*cf. R.A.E.*, A **46** 475]. Stocks from both areas were reared under natural conditions at a place in the two-generation one, and the results obtained in 1958 are described. Adult emergence after hibernation occurred about 25 days later for the two- than for the three-generation stock, and the larvae of the former could not pupate without feeding on young ears, which were not available until late August. Between

June and August, the two stocks gave rise to one and two generations, respectively, on the same food-plant, but an intermediate generation occurred in both before hibernation when they were artificially forced to feed on rice grown in autumn. The two stocks were interfertile, but there were differences in the type of damage caused to the rice leaves.

KISIMOTO (R.). **Differences in several morphological and physiological characters between two species of the green rice leafhoppers,** *Nephotettix cincticeps* **Uhler and** *N. apicalis* **Motschulsky (Homoptera, Jassidae).**—*Jap. J. appl. Ent. Zool.* **3** no. 2 pp. 128–135, 6 graphs, 9 refs. Tokyo, 1959. (With a summary in Japanese.)

Nephotettix cincticeps (Uhl.), which was formerly considered a subspecies of *N. apicalis* (Motsch.) (*bipunctatus* (F.)) [*cf. R.A.E.*, A **30** 383, note] but was raised to specific rank by Linnavuori in 1956, is a common pest of rice in Japan. *N. apicalis* has itself recently been found in the Kyushu district, and the two were therefore reared on rice and compared. It was found that eggs and larvae of *N. cincticeps* of a stock from Kyoto developed more rapidly than those of *N. apicalis*. There was little difference in rate of oviposition. Adult body size decreased with a rise in temperature in *N. apicalis*, and increased slightly in the female and decreased in the male of *N. cincticeps*. Exposure to a short daily photoperiod of 8 hours at 20°C. [68°F.] caused diapause in the fourth or fifth nymphal instar of *N. cincticeps* [*cf.* **49** 388], but merely prolonged development and slightly reduced adult body size in *N. apicalis*. It is concluded that *N. cincticeps* is adapted to northerly conditions and *N. apicalis* to southerly ones.

NAKATA (M.). **Recent distribution of the fall webworm,** *Hyphantria cunea* **D., and its control.** [*In Japanese.*]—*Jap. J. appl. Ent. Zool.* **3** no. 2 pp. 138–139, 2 refs. Tokyo, 1959.

The distribution of *Hyphantria cunea* (Dru.) in Honshu, Japan [*cf. R.A.E.*, A **47** 454] is still increasing. In the south of the Kanto district, where the Arctiid was first found, its population density has decreased but spread continues. It has also appeared in the Tohoku district (in Fukushima Prefecture in 1955 and Miyagi in 1956), in the Hokuriku district (in Toyama in 1954 and Niigata and Ishikawa in 1955) and in the Kansai district (in Aichi in 1952, Osaka in 1953 and Hyogo and Okayama in 1955). Attempts at eradication are being made by means of sprays of DDT, BHC and, in some areas since 1958, trichlorphon (Dipterex), and the removal of branches bearing larval nests. Where the pest was detected before it reached outbreak numbers, intensive control for 3–4 years resulted in almost complete eradication.

ISHII (S.), AZIM (A.) & HIRANO (C.). **A further experiment on the effect of dietary levels of protein and carbohydrate on the growth of the rice stem borer,** *Chilo suppressalis*, **larvae.**—*Jap. J. appl. Ent. Zool.* **3** no. 2 pp. 143–145, 2 refs. Tokyo, 1959.

The following is based on the authors' summary. An experiment was carried out in the laboratory in Japan to investigate the protein and carbohydrate requirements of the larvae of *Chilo suppressalis* (Wlk.) during their

30-day period of growth. This period was divided into two 15-day periods termed the early and late periods. The data obtained showed clearly that the larvae require protein-rich food during both periods but that the high protein requirements are more distinct in the early than in the late period. Carbohydrate was less essential.

TSUGAWA (C.) & YAMADA (M.). **Forecasting the outbreak of destructive insects in apple orchards. I. Forecasting the initial date of hatch in respect of the overwintering Comstock mealy-bug,** *Pseudococcus comstocki* **Kuwana, in Aomori Prefecture.** [*In Japanese.*]—*Jap. J. appl. Ent. Zool.* **3** no. 3 pp. 172–176, 1 graph, 11 refs. Tokyo, 1959. (With a summary in English.)

Laboratory and field observations were made in Aomori Prefecture, Japan, in 1949–58 with a view to developing a method of forecasting the date of hatching of the overwintered eggs of *Pseudococcus comstocki* (Kuw.) in apple orchards. It was found in the laboratory that about 9°C. [48·2°F.] was the lowest temperature for development of the overwintering eggs, and that a sum of effective temperatures of 220 day-degrees C. [396 F.] was required for its completion. In the field, there was a high degree of correlation between the hatching date and the temperature accumulated between 1st March and 20th May and also a relation to the beginning and peak of flowering of three varieties of apple. These results are used to construct formulae for predicting the date of hatch, and it is pointed out that the formulae can also be used to ascertain the best dates at which to apply control measures, since an adhesive should be applied to the trees 2–3 days before and insecticides 10–14 days after the initial hatching date.

NISHIJIMA (Y.). **The occurrence of embryoless seeds in soybean varieties in relation to the feeding of the soybean pod borer,** *Grapholitha glycinivorella* **Matsumura.** [*In Japanese.*]—*Jap. J. appl. Ent. Zool.* **3** no. 3 pp. 183–189, 1 pl., 1 graph, 27 refs. Tokyo, 1959. (With a summary in English.)

An account is given of investigations in Japan showing that the occurrence of embryoless seeds in soy-bean pods is caused by larvae of *Cydia* (*Grapholitha*) *glycinivorella* (Mats.) that enter the pods but die before feeding on the seeds; it apparently results from mechanical injury to the funicle.

KISIMOTO (R.). **Studies on the diapause in the planthoppers and leafhoppers. III. Sensitivity of various larval stages to photoperiod and the forms of ensuing adults in the green rice leafhopper,** *Nephotettix cincticeps* **Uhler.**—*Jap. J. appl. Ent. Zool.* **3** no. 3 pp. 200–207, 7 figs., 12 refs. Tokyo, 1959. (With a summary in Japanese.)

It is shown in this third part of a series [*cf. R.A.E.*, A **49** 388, etc.] that the diapause induced in fourth- or fifth-instar nymphs of *Nephotettix cincticeps* (Uhl.) by exposure to a short daily photoperiod of 8 hours occurs in all individuals only when exposure is begun in the first instar. Exposure to long photoperiod (16 hours), even in the first instar only, causes 60–70 per cent. of the nymphs to develop without diapause. The relation of the various photoperiods to body characters and coloration is discussed.

CALNAIDO (D.). **Notes on the distribution and biology of the *Lygus* bug—*Lygus viridanus* Motsch—(Heteroptera-Miridae), a pest of tea in Ceylon.**—*Tea Quart.* **30** pt. 2–3 pp. 108–112, 3 refs. Talawakelle, 1959.

Two species of *Lygus*, *L. decoloratus* Dist. and *L. viridanus* (Motsch.), occur on tea in Ceylon, and sporadic outbreaks were recorded in 1956 and 1957. *L. viridanus* was the commoner, and, as little was known of its bionomics, investigations were made. This species appears to be endemic to Ceylon, but is confined to the cooler and more humid parts of the hill country. In addition to tea, it infests ornamental plants. Infestation of tea is usually restricted to fields at an elevation of 5,000–6,000 ft., situated close to jungle, in which the Mirid is numerous. Damage is commonest in April–June. The eggs are laid in tender tissues and hatch in 13–20 days. The nymphal stage lasts about three weeks, and the adults live for 2–3 months. Feeding occurs on young, succulent tissue, and the saliva has a toxic effect on the surrounding area. Sprays of 4 lb. 50 per cent. wettable DDT in 100 gal. water per acre gave good control.

MOHAMMAD ALI (S.). **Common sugarcane mealy bugs in Bihar (Coccidae: Hemiptera).**—*Indian J. sugarcane Res.* **2** pt. 4 pp. 179–183, 5 figs., 8 refs. New Delhi, 1958.

Three species of mealybugs found to be common on sugar-cane in Bihar were identified as *Ripersia sacchari* Green, *Saccharicoccus sacchari* (Ckll.) and *Pseudococcus saccharifolii* (Green). In view of some doubt as to the specific distinctness of the last two, their morphology and bionomics were investigated, and the results are here recorded. They were found to be distinct, and morphological and biological characters differentiating *R. sacchari* and *S. sacchari* and *S. sacchari* and *P. saccharifolii* are given in tables.

SUBRAMANIAN (T. R.). **The biology of the weevil *Alcidodes mysticus* Faust (Coleoptera: Curculionidae).**—*J. Bombay nat. Hist. Soc.* **55** (1958) no. 3 pp. 460–472, 2 pls., 4 refs. Bombay, 1959.

The following is based on the author's summary. *Alcidodes mysticus* (Faust) was found attacking Sea Island cotton at Pattambi (south Malabar) early in October 1951 [*cf. R.A.E.*, A **43** 67]. The larvae bore in the stems, stunting the plants and reducing the yield. Observations on the life-history of the weevil showed that the eggs were laid in excavations on terminal shoots and petioles 8–13 days after adult emergence and hatched in 6–7 days. The larval and pupal stages lasted 48–52 and 9–11 days, and the adult males and females survived in captivity for 8–37 and 15–38 days, respectively. Not more than 38 eggs were laid per female, and the oviposition period lasted only 33 days. Only one generation developed per crop. Other varieties of cotton are attacked, and adults have been taken on several further plants. A few of the larvae were parasitised by *Bracon greeni* Ashm.

ROONWAL (M. L.), CHATTERJEE (P. N.) & THAPA (R. S.). **Results of laboratory and field experiments on protection of bamboos in storage against ghoon beetles, *Dinoderus* spp. (Coleoptera: Bostrychidae).**—*Indian For. Bull.* (N.S.) Ent. no. 216, [1+] 32 pp., 2 pls., 10 refs. Delhi, 1959.

The experiments here described in detail were carried out in India in 1950–54. Laboratory tests in 1950–51 and 1951–52 showed that stacked bamboos (chiefly *Dendrocalamus strictus*) could be almost completely protected from attack by *Dinoderus* spp. for a year by sprays of 0·33–1 per cent. γ BHC or 5 per cent. DDT in kerosene. In two depot experiments in 1953 and 1954, almost complete protection was given by sprays of 0·5 per cent. BHC in suspension or ¼ oz. Dieldrex (1·8 lb. dieldrin per gal.) in 2 or 3½ gal. water, and 90 per cent. protection by Aldrex 24 (2·4 lb. aldrin per gal.) at ½ oz. in 2 gal. or 1 oz. in 5 gal. water. Aldrex and the BHC suspension also provided considerable control of existing incipient infestations. The cost of treatment is given.

Collings (H.). **Hermetic sealing of a stack of maize with bituminous roofing felt.**—*Trop. Agriculture (Trin.)* **37** no. 1 pp. 53–60, 5 figs., 1 ref. London, 1960.

Details are given of an experiment in Tanganyika in which a stack of 166 tons of maize in bags was covered with two-ply bituminous roofing felt in December 1956, hermetically sealed with bitumen, and sampled at intervals for insect infestation and changes in the carbon dioxide and oxygen concentrations of the air. The grain was initially lightly infested by *Tribolium* sp. and *Oryzaephilus* sp. and was exposed to attack by *Cadra (Ephestia) cautella* (Wlk.) and *T. castaneum* (Hbst.). The existing infestation was halved in 56 days, and no insects were found after 360 days, when the maize was in fair or good condition. The stack was resealed and others constructed. The condition of the maize remained unchanged in November 1958.

Mason (E. C.). **Observations on the life history and control of the vine weevil on cyclamen and foliage plants.**—*J. R. hort. Soc.* **85** pt. 3 pp. 123–128, 5 refs. London, 1960.

Larvae of *Otiorhynchus sulcatus* (F.) caused severe losses of *Cyclamen* at a nursery in Hertfordshire in the late autumn of 1952. Observations on the bionomics of the weevil in the glasshouse [*cf. R.A.E.*, A **21** 194] indicated that only one generation is completed in a year, but that all stages are present at all times. Ornamental plants of other species were also attacked. In tests on the protection of *Cyclamen* from attack by the larvae, the addition of 3 oz. 1·25 per cent. aldrin or 4 oz. 1·5 per cent. dieldrin dust to each bushel of potting compost proved effective for 6–8 months. The adult population was greatly reduced by parathion smokes, and a 0·01 per cent. γ BHC drench gave good kill of larvae attacking the roots of non-bulbous plants.

MacLagan (D. S.). **Bionomics of onion fly and its control by seed dressings.**—*Scot. Agric.* **39** no. 4 pp. 201–204, 3 refs. Edinburgh, 1960.

In a field test in western Scotland in 1959 on the value of seed dressings for the protection of onions from *Hylemyia (Delia) antiqua* (Mg.), the bionomics of which are reviewed, excellent results were given by combined treatment with ¼ oz. dieldrin and ⅕ oz. thiram (50 per cent.) per lb. seed. Thiram alone was valueless, and dieldrin alone of little use, even at a higher rate. The onions were not tainted.

PAPERS NOTICED BY TITLE ONLY.

SZMIDT (A.). **Forstentomologische Probleme in Polen.** [Problems of forest entomology in Poland (a review of the principal pests).]—*Anz. Schädlingsk.* **33** pt. 6 pp. 81–83, 3 graphs, 3 refs. Berlin, 1960.

LANGE (S.). **Untersuchungen über die Anwendbarkeit der Schalldiagnose in der Forstpathologie.** [Investigations on the use of echo diagnosis in forest pathology (for determination of insect and other infestation in trunks, etc.).]—*Wiss. Z. tech. HochSch. Dresden* **7** pt. 5 pp. 1045–1059, 13 figs., 47 refs. Dresden, 1958.

KÖRTING (A.). **Durch Hausbockbefall bedingte Gewichtsminderungen des Holzes als Kriterium für die Stärke der Frasstätigkeit.** [Decrease in weight of wood infested by *Hylotrupes bajulus* (L.) as a criterion of the degree of feeding activity.]—*Holz a. Roh- u. Werkst.* **18** pp. 167–170, 4 figs., 6 refs. Berlin, 1960. (With a summary in English.)

RUSS (K.). **Starke Schäden an Wein durch den "Rhomben-Spanner" (*Boarmia gemmaria* Brahm.).** [Serious damage to vines by *B. rhomboidaria* (Schiff.) (*gemmaria* (Brahm)) (in Austria).]—*Pflanzenarzt* **14** no. 6 pp. 53–54, 2 figs. Vienna, 1961.

PARKER (R. L.). **Notes on oviposition behavior responses of the codling moth, *Carpocapsa* [*Cydia*] *pomonella* L., to air movement, temperature, and light.**—*J. Kans. ent. Soc.* **32** no. 4 pp. 152–154, 7 refs. Manhattan, Kans., 1959.

BARNES (H. F.). **The resistance of some American wheats to Hessian fly [*Mayetiola destructor* (Say)] of mixed foreign parentage.**—*J. Kans. ent. Soc.* **33** no. 1 pp. 37–44, 8 refs. Manhattan, Kans., 1960.

MOHAMMAD ALI (S.) & PRASAD (A. R.). **Studies on the post-embryonic development of *Apanteles flavipes* Cam. (Braconidae–Hymenoptera), a parasite of sugarcane stem borers in India.**—*Indian J. Sugarcane Res.* **2** pt. 2 pp. 71–75, 4 figs., 5 refs. New Delhi, 1958.

KEY (K. H. L.). **The ecology and biogeography of Australian grasshoppers and locusts.** [*In*] KEAST (A.), CROCKER (R. L.) & CHRISTIAN (C. S.). Ed. **Biogeography and ecology in Australia.**—*Monogr. biol.* **8** pp. 192–210, 37 refs. The Hague, W. Junk, 1959.

CALABY (J. H.) & GAY (F. J.). **Aspects of the distribution and ecology of Australian termites.** [*In*] KEAST (A.), CROCKER (R. L.) & CHRISTIAN (C. S.). Ed. **Biogeography and ecology in Australia.**—*Monogr. biol.* **8** pp. 211–223, 12 refs. The Hague, W. Junk, 1959.

SCHWARTZ (E.) & SCHMIDT (M.). **Vergleichende Untersuchungen über die insektizide Wirksamkeit von Lindan- und HCH-Präparaten verschiedener Reinigungsgrade.** [Comparative investigations on the insecticidal effectiveness of γ BHC and BHC preparations of various degrees of purity (against *Leptinotarsa decemlineata* (Say)).]—*NachrBl. dtsch. PflSchDienst* (N.F.) **14** pt. 6 pp. 105–109, 2 graphs, 17 refs. Berlin, 1960. (With summaries in Russian & English.)

KLEE (O.). **Über den Einfluss der Temperatur und der Luftfeuchtigkeit auf die toxische Wirkung organisch-synthetischer Insektizide.** [On the influence of temperature and atmospheric humidity on the toxic effect (on various insects) of organic synthetic insecticides (DDT and Thiodan).]—*Z. angew. Zool.* **47** pt. 2 pp. 183–229, 17 figs., 3½ pp. refs. Berlin, 1960. (With a summary in English.)

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INDEX OF AUTHORS

Adams, J. B., 485.
Adkisson, P. L., 471.
Agafonova, Z. Ya., 462.
Albrecht, F. O., 446.
Alza D., A., 490, 492.
Amos, T. G., 452.
Angeles, N., 487.
Arellano, M., 490.
Ashby, K. R., 450, 451.
Attiah, H. H., 471.
Atwal, A. S., 484.
Auersch, O., 458.
Azim, A., 496.

Bachmann, F., 457.
Bakke, A., 462.
Balch, R. E., 476.
Barnes, H. F., 500.
Bartlett, B. R., 467.
Bassen, J. L., 473.
Beingolea G., O. D., 488, 489.
Bergold, G. H., 473.
Bertus, A. L., 445.
Blais, J. R., 480.
Bonnemaison, L., 453.
Borisova, A. E., 466.
Bous, A. K., 464.
Bradley, R. H. E., 479.
Burdick, D. J., 477.
Burnett, T., 484.

Calaby, J. H., 500.
Calnaido, D., 498.
Cant, R. R., 494.
Carbonell, C. S., 487.
Casida, J. E., 469.
Chatterjee, P. N., 498.
Christian, C. S., 493, 500.
Clifford, P. A., 473.
Collings, H., 499.
Coppel, H. C., 469.
Coutin, R., 454, 455.
Crocker, R. L., 493, 500.

Dauterman, W. C., 469.
Davey, J. T., 447.
Davey, P. M., 452.
David, W. A. L., 449.
Dobson, R. M., 450.
Dodd, A. P., 493.

Édel'man, N. M., 464, 466.
Ellertson, F. E., 472.
Estrada R., F. A., 446.
Evans, W. G., 472.

Feltz, H., 455.
Fox, C. J. S., 475.
Fraenkel, G. S., 468.

García B., G., 491.
Gardiner, B. O. C., 449.
Gay, F. J., 500.
Getzin, L. W., 473.
Godan, D., 456.
González B., J. E., 490, 491, 493.
Green, A. A., 449.
Griffiths, K. J., 482.
Guennelon, G. 454.
Györfi, J., 460.

Hall, H. H., 475.
Hall, J. C., 467.
Halton, P., 452.
Harcourt, D. G., 481.
Harris jr., E. D., 471.
Harris, P., 484.
Haynes, W. C., 475.
Heron, R. J., 468.
Herrera A., J. M., 488.
Hetrick, L. A., 470.
Hirano, C., 494, 496.
Hirao, J., 495.
Holt, W. R., 475.

Ichinose, T., 495.
Ishii, S., 494, 496.

Jacobson, L. A., 468.
Jancke, G. D., 458.
Jaques, R. P., 474.
Juillet, J. A., 478.

Keast, A., 493, 500.
Key, K. H. L., 500.
Kilpatrick, D. T., 494.
King, D. R., 472.
Kisimoto, R., 496, 497.
Klee, O., 500.
Komarova, O. S., 463.
Körting, A., 500.
Kreasky, J. B., 468.
Krywienczyk, J., 473.

Lamas, J. M., 488.
Lampel, G., 462.
Lange, S., 500.
Leius, K., 478.
LeRoux, E. J., 476.
Lobatón M., M., 492.
Lopes Cabral, A., 446.
López Matos, L., 445.

[*Continued on p. iv*

MacGillivray, M. E., 479.
MacLagan, D. S., 499.
MacLellan, C. R., 483.
Majernik, O., 461.
Malўsheva, M. S., 464.
Martignoni, M. E., 475.
Martin, J. L., 480.
Martin Ravines, H., 491.
Marx, R., 455.
Maslennikova, V. A., 465.
Mason, E. C., 499.
Matthews, G. A., 448.
Mayer, K., 456.
Merino S. S., E., 492.
Miller, B. S., 452.
Mills, P. A., 473.
Missonnier, J., 453.
Mohammad Ali, S., 498, 500.
Moreira, I. S., 446.
Muma, M. H., 470.
Musolff, W., 456.

Naito, A., 494.
Nakata, M., 496.
Neilson, W. T. A., 483.
Nishijima, Y., 497.

Oldiges, H., 459.
O'Neill, K., 469.
Osaka, K., 494.

Paredes, P. P., 486, 487
Parker, R. L., 500.
Parkin, E. A., 449.
Peiris, J. W. L., 445.
Perron, J. P., 476.
Postner, M., 459.
Powell, J. A., 477.
Prasad, A. R., 500.
Prescott, H. W., 469.
Prilop, H., 458.

Rafes, P. M., 466.
Rao, V. P., 476.
Risco B., S. H., 489.
Ritcher, P. O., 472.
Roonwal, M. L., 498.
Rosberg, D. W., 472.
Ruffinelli, A., 487.
Russ, K., 500.
Rўvkin, B. V., 464.

St. Julian jr., G., 475.
Salazar Torres, J., 489 493.
Saldarriaga Y., J., 490.
Sawicki, R. M., 452.
Schefer-Immel, V., 457.
Schlinger, E. I., 467.
Schmid, P., 475.
Schmidt, M., 500.
Schremmer, F., 460.
Schütte, F., 457.
Schwartz, E., 500.
Scott, E. I. C., 449.
Shekleton, M. C., 475.
Shibuya, S., 495.
Shumakov, E. M., 466.
Silver, G. T., 481.
Simmonds, F. J., 476.
Simón, J. E., 490.
Smirnoff, W. A., 474.
Sokal, R. R., 471.
Subramanian, T. R., 498.
Sweeney, R. C. H., 448.
Swenson, K. G., 470.
Szmidt, A., 457, 500.
Szumkowski, W., 487.

Tannert, W., 459.
Tashiro, H., 475.
Tereznikova, E. M., 466.
Ter-Minasyan, M. E., 464.
Thain, E. M., 452.
Thapa, R. S., 498.
Thobbi, V. V., 445.
Todd, D. H., 493.
Tripp, H. A., 479.
Tsugawa, C., 497.
Tunstall, J. P., 448.
Tuthill, L. D., 487.

Wellington, W. G., 482, 485.
Weyrauch, W., 492.
Wille, J. E., 488.
Winner, C., 455.
Wright, C. G., 467.

Yamada, M., 497.
Yamamoto, R. T., 468.
York, G. T., 476.

CONTENTS

PAGE
Africa: *Locusta migratoria migratorioides* in the Central Niger delta ... 447
Africa: Investigations on cotton pests in Rhodesia and Nyasaland 448
Africa: Bionomics of *Caryedon gonagra* in the Gambia 449
Africa: *Epichorista ionephela* injuring pear in South Africa 458
Africa: Roofing felt protecting a stack of maize in Tanganyika 499
America, North: The Aphidiines of the Pacific coast 467
Australia: The biological control of prickly pear 493
Australia: Ecology and biogeography of grasshoppers and locusts (*Title only*) 500
Australia: The distribution and ecology of termites (*Title only*) 500
Australia, South: The first occurrence of *Quadraspidiotus perniciosus* ... 494
Australia, South: *Tetranychus telarius* on pear and its control 494
Austria: Pests of larch near Vienna 460
Austria: *Boarmia rhomboidaria* injuring vines (*Title only*) 500
Britain: Natural enemies of the pupae of *Hylemyia coarctata* 450
Britain: Production of resin and survival of *Rhyacionia buoliana* 484
Britain: *Otiorhynchus sulcatus* attacking *Cyclamen* 499
Britain: Seed dressings of dieldrin and thiram against *Hylemyia antiqua* 499
Canada: Photoperiod and the preoviposition period of *Chorizagrotis auxiliaris* 468
Canada: Cocoon submergence and mortality of *Pristiphora erichsonii* and its parasites 468
Canada: Investigations on a virus disease of *Neodiprion swainei* 474
Canada: *Metarrhizium anisopliae* attacking *Agriotes obscurus* in Nova Scotia 475
Canada: The life-cycle and predatory habit of *Coenosia tigrina* 476

[*Continued on p. iii of cover*

CONTENTS—*cont.*

PAGE
CANADA: Biological control in forest entomology 476
CANADA: Attractiveness of food to adult parasites 478
CANADA: Bionomics of two parasites of *Rhyacionia buoliana* 478
CANADA: The life-history of *Spathimeigenia spinigera* parasitising *Neodiprion swainei* 479
CANADA: *Myzus certus* feeding on potato and transmitting virus Y 479
CANADA: The bionomics of *Profenusa thomsoni* on birch 480
CANADA: The parasites of *Choristoneura fumiferana* in Quebec 480
CANADA: The weather and outbreaks of *Acleris variana* 481
CANADA: The natural enemies of *Plutella maculipennis* 481
CANADA: The oviposition pattern of *Neodiprion lecontei* 482
CANADA: Hydrolysed proteins as lures for *Rhagoletis pomonella* 483
CANADA: Selection of overwintering sites by *Cydia pomonella* 483
CANADA: Effects of 2,4-D on predacious Coccinellids 485
CANADA: Qualitative changes in a population of *Malacosoma pluviale* ... 485
CEYLON: The presence of the tristeza virus of *Citrus* 445
CEYLON: The distribution and bionomics of *Lygus viridanus* on tea 498
CZECHOSLOVAKIA: Bark-beetles and a disease of apricot 461
FRANCE: The control of *Pegomyia betae* on beet 453
FRANCE: The bionomics and control of *Anuraphis roseus* 453
FRANCE: Poor response of *Cydia pomonella* to bait-traps 454
FRANCE: Cetoniids on fruit trees and their control 454
FRANCE: The larval diapause in *Contarinia* spp. 455
GERMANY: *Blaniulus guttulatus* and Collembola injuring sugar beet 455
GERMANY: *Mymar autumnalis* parasitising the eggs of *Ceutorhynchus assimilis* 456
GERMANY: Coloured traps and *Oscinella frit* 456
GERMANY: Two leaf-miners on poplar 457
GERMANY: Effectiveness of birds against *Tortrix viridana* 457
GERMANY: *Aphis nasturtii* overwintering on *Frangula alnus* 458
GERMANY: Observations on *Adoxophyes orana* on fruit trees 458
GERMANY: Fertilisers increasing mortality of forest pests 459
GERMANY: *Agevillea abietis* and its control 459
GERMANY: A Mymarid parasitising *Pemphigus* spp. on poplar 462
HUNGARY: Observations on *Melolontha* spp. 460
INDIA: *Hispa stygia* attacking rice and its control 445
INDIA: Mealybugs on sugar-cane in Bihar 498
INDIA: The bionomics of *Alcidodes mysticus* attacking cotton 498
INDIA: Sprays protecting stored bamboos from *Dinoderus* 498
INDIA: The post-embryonic development of *Apanteles flavipes* (*Title only*) ... 500
JAPAN: Phosphorus fertilisers not affecting growth of *Chilo suppressalis* ... 494
JAPAN: *Asphondylia* sp. and its parasites on soy bean 494
JAPAN: Nomenclature and bionomics of *Autographa nigrisigna* 495
JAPAN: Local variation in the bionomics of *Chlorops oryzae* 495
JAPAN: The bionomics of *Nephotettix cicticeps* and *N. apicalis* 496
JAPAN: The spread of *Hyphantria cunea* 496
JAPAN: Dietary requirements of *Chilo suppressalis* 496
JAPAN: Forecasting the date of hatch of *Pseudococcus comstocki* 497
JAPAN: *Cydia glycinivorella* and embryoless soy-bean seeds 497
JAPAN: Diapause in *Nephotettix cincticeps* and photoperiod 497
KASHMIR: A first record of *Plutella maculipennis* 476
NEW ZEALAND: A virus disease controlling *Pieris rapae* 493
NICARAGUA: The insects associated with maize 446
NORWAY: The distribution and injuriousness of *Hylotrupes bajulus* 462
NORWAY: Insects attacking spruce and pine timber 462
PERU: Three new Psyllids on crop plants 487
PERU: The advantage of biological control of cotton pests 488
PERU: Rearing and field use of *Trichogramma* 488
PERU: Lists of parasites and predators of cotton pests 488
PERU: The spread of *Eutinobothrus gossypii* 488
PERU: *Hyalochloria denticornis* preying on cotton pests 488
PERU: *Encarsia* spp. parasitising the eggs of cotton pests 489
PERU: *Aleurothrixus floccosus* on *Citrus* and its control 489
PERU: Biological control of *Diatraea saccharalis* on sugar-cane 489
PERU: Natural enemies of two pests of rice 489
PERU: Endrin controlling *Diatraea saccharalis* on maize 490
PERU: The insect pests of beans 490
PERU: The migration of *Dysdercus peruvianus* 490
PERU: Resistance to BHC in *Dysdercus peruvianus* 491
PERU: Age of cotton bolls attacked by *Dysdercus peruvianus* 491
PERU: *Bucculatrix* on cotton and its natural enemies 491
PERU: The injuriousness of *Mescinia peruella* 492

[*Continued on p. iv of cover*

CONTENTS—*cont.*

PAGE
PERU: The sex ratio of *Dysdercus peruvianus* 492
PERU: The bionomics of *Eutinobothrus gossypii* on cotton 492
PERU: *Rogas* sp. parasitising *Anomis texana* on cotton 492
PERU: Methyl-bromide fumigation of maize under plastic sheeting 493
PERU: The voracity of *Dysdercus peruvianus* 493
POLAND: Problems of forest entomology (*Title only*) 500
PORTUGAL: Stored-product pests in ships from Guinea 446
URUGUAY: A list of arthropods of economic importance 487
U.S.S.R.: *Mesopolobus* sp. infesting the seeds of *Bromus inermis* 462
U.S.S.R.: Investigations on the pupal diapause of *Heliothis armigera* ... 463
U.S.S.R.: A new weevil on vines in the Maritime region 464
U.S.S.R.: *Scolytus intricatus* transmitting an oak fungus 464
U.S.S.R.: The bionomics and effectiveness of *Trichogramma embryophagum* 464
U.S.S.R.: Conditions determining diapause in *Pieris brassicae* and *Apanteles glomeratus* 465
U.S.S.R.: Artificial media for rearing phytophagous Lepidoptera 466
U.S.S.R.: The larval galleries of Siricids 466
U.S.S.R.: Coccids on fruit trees in the Transcarpathian region 466
U.S.A.: The bionomics of *Lyctus planicollis* 467
U.S.A.: A biological race of *Saissetia oleae* on fig 467
U.S.A.: Egg development of grasshoppers in the Rocky Mts. 468
U.S.A.: Oviposition and feeding stimulants for *Protoparce sexta* 468
U.S.A.: *Haplothrips clarisetis* in California and New Mexico 469
U.S.A.: A sex attractant in *Diprion similis* 469
U.S.A.: Parasitism of grasshoppers by a Nemestrinid 469
U.S.A.: Chrysopids and their parasites in Florida 470
U.S.A.: Bionomics of *Neodiprion excitans* on pine in Florida 470
U.S.A.: Control of budworms on sweet maize in Florida 471
U.S.A.: *Aceria mangiferae* and *A. sheldoni* in Florida 471
U.S.A.: Relative humidity and egg hatch of *Pectinophora gossypiella* ... 471
U.S.A.: The bionomics and control of *Hypera variabilis* in Virginia ... 472
U.S.A.: Pests of pecan in Texas 472
U.S.A.: The bionomics of *Pleocoma* spp. in Oregon 472
U.S.A.: Chlorinated insecticide residues in milk 473
U.S.A.: *Beauveria rileyi* attacking *Trichoplusia ni* in Texas 473
U.S.A.: Resistance to virus infection in populations of two Lepidoptera ... 475
U.S.A.: *Metarrhizium anisopliae* infesting *Dendroctonus terebrans* 475
U.S.A.: *Perezia pyraustae* infecting parasites of *Ostrinia nubilalis* 476
U.S.A.: Two Gelechiids attacking cones of *Pinus sabiniana* 477
U.S.A.: Resistance of American wheats to *Mayetiola destructor* (*Title only*) 500
VENEZUELA: Changing distribution of *Diatraea buskella* and *D. rosa* ... 486
VENEZUELA: *Diatraea saccharalis* on rice and its biological control 487
WEST INDIES: Tobacco-etch virus found in Porto Rico 445
Effects of crowding on the progeny of *Nomadacris septemfasciata* 446
Germination of seeds stored in contact with insecticide dusts 449
Mating behaviour of *Pieris brassicae* in laboratory culture 449
Studies on the development of *Cryptolestes pusillus* 450
The population dynamics of *Cryptolestes ferrugineus* 451
Analysis of commercial pyrethrum extracts for insecticidal constituents ... 452
Tests of sack materials for penetration by insects 452
The damage to wheat caused by *Sitodiplosis mosellana* 452
The causes of resistance to insecticides 456
Host selection by *Dahlbominus fuscipennis* 457
The insecticidal effectiveness of dichlorvos 457
BHC protecting insect collections against *Anthrenus* 459
Factors in transmission of bean yellow mosaic by *Myzus persicae* 470
DDT-resistance and the characters of *Drosophila melanogaster* 471
Serological studies of inclusion-body proteins of insect viruses 473
Effects of physical stress on larvae of *Trichoplusia ni* 474
Preservation of milky-disease bacteria by lyophilisation 475
Direct observation in studies of temperature effects on light reactions 482
Observations on populations of *Trialeurodes vaporariorum* and *Encarsia formosa* 484
Factors affecting acclimatisation of *Anagasta kühniella* to sub-zero temperature 484
The use of echo diagnosis in forest entomology (*Title only*) 500
Feeding by *Hylotrupes bajulus* and weight of wood (*Title only*) 500
Notes on oviposition behaviour of *Cydia pomonella* (*Title only*) 500
The insecticidal effectiveness of γ BHC and BHC preparations (*Title only*) 500
Factors affecting toxicity of DDT and Thiodan (*Title only*) 500

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